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American Academy of Ophthalmology and Oto-Laryngology

OPHTHALMOLOGICAL DIVISION

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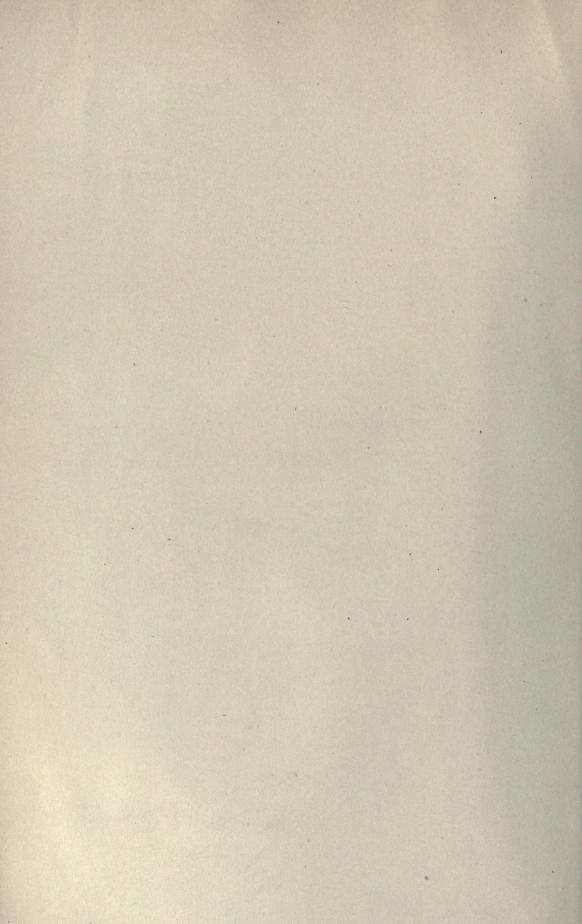
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The Fourteenth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology will be held in New York City, Oct. 4, 5 and 6, 1909.

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SECTION ON OPHTHALMOLOGY

TABLE OF CONTENTS

	PAGE
The Limitation of Ophthalmic Practice. D. T. VAIL	1
The Limitation of Oto-Laryngologic Practice. J. C. Beck	7
Concerning the Etiology of Chorioiditis. J. B. LAWFORD	11
The Distant Effect of Anomalies of the Upper Air Passages.	
HENRY GRADLE	23
The Mind of the Patient. SAM C. NORRIS	31
"Ophthalmic Physician and Surgeon" or "Oculist and Aurist"—Which? LUCIEN HOWE	45
The Sphenoidal Sinus as a Possible Etiological Factor in the Production of Retrobulbar Neuritis from an Anatomical Basis. Observations on Sixty Specimens. Lee Master Francis	52
Pseudo-optic Neuritis. T. B. Schneidemann	60
Auditory Disturbances of Ocular Origin. F. PARK LEWIS	66
Refractive Myopia. Francis Valk	82
Diseases of the Lacrimal Apparatus, Etiology and Treatment, with	
Special Reference to Extirpation of the Sac. Charles S. Means	96
The Teaching of Ocular Pathology to Graduates and Undergraduates in Medicine. Casey A. Wood	
Ophthalmology for Students of General Practice. Leartus Connor.	108
Teaching Regarding the Effects, Diagnosis and Correction of Errors of Refraction. Edward Jackson	115
Exophthalmic Goiter. Albert R. Baker	129
Some Facts Concerning a Family Form of Exophoria. Wendell Reber	138
Metastatic Carcinoma of the Chorioid—a Critical Study, with Case Report. George F. Suker and Lorenzo N. Grosvenor	148
An Epidemic of Pneumococcus Infection and Remarks on Acute Con-	
junetivitis. Adolf Alt	172
Postoperative Sympathetic Ophthalmitis. Don M. Campbell	177
Sympathetic Ophthalmia Following Mules' Operation. HAROLD	
GIFFORD	
Two Cases of Parinaud's Conjunctivitis, with Remarks. C. BARCK Analytical Description of the Eye as an End Organ. Joseph E. Willetts:	
WILLETTS' A New Method of Tendon Shortening—Presentation of Instruments.	202
H. H. Briggs	
Increased Tension in Ocular Disease of Infancy and Childhood. John E. Brown	215
Operative Treatment of Persistent Glaucoma. PERCY FRIDENBERG	223
Hereditary Blindness and Its Prevention. CLARENCE LOEB	246
Further Consideration on Major Smith's (Indian Method) Cataract Extraction. W. GREEN	

EXHIBITION OF INSTRUMENTS

EMILIDITION OF	INSTRUMENTS
	PAGE
Major Smith Cataract Set. D. W.	Green 273
Iris Forceps. L. M. FRANCIS	
Lacrimal Syringe. MARK D. STEVEN	vson
Lacrimal Speculum. MARK D. STEV	
Knife Depressor. Mark D. Stevense	
Tonsil Knife. MARK D. STEVENSON.	
Tonsil Scissors. MARK D. STEVENSO	N 277
DISCUS	SSIONS.
PAGE	PAGE
Alt, Adolf	Jackson, Edward49,
125, 176, 185, 201, 245, 266	58 64, 94, 126, 176, 185, 214, 243
Andrews, A. H 50	Kirkendall, J. S
Baker, A. R122, 137, 244	Lewis, Eugene 78
Barek, C79, 102, 125	Lewis, F. Park42, 80, 265
Beck, J. C	Loeb, Clarence 266
Briggs, H. H 214	Louchery, D. C 42
Bryant, W. Sohier 50	McAllister, J. C41, 125
Byington, J. F 126	Means, Chas. S 194
Campbell, Don	Norris, Sam C 44
Connor, L	Ray, J. M 214
Dayton, W. L 80	Reber, Wendell64, 122, 147, 185
Davis, J. Leslie 41	Reeve, R. A124, 245
Dodd, Oscar 56	Robinson, J. R 43
Francis, L. M	Schneidemann, T. B 121, 147, 183
Fridenberg, P43, 57, 65, 78, 245	Stubbs, J. G 58
Gradle, Henry	Stueber, F. G
Gibson, J. A43, 50	Stucky, J. A
Gifford, Harold 80	Vail, D. T
Green, D. W	64, 128, 136, 193, 211, 244, 266
Grosvenor, L. N	Valk, Francis95, 121, 147
Holinger, J	Wood, Casey A63, 124, 126, 176
Howe, Lucien51 94, 147, 265	Young, H. B184, 266

SECTION ON OTO-LARYNGOLOGY

TABLE OF	CONTENTS
	PAGE
The Future Development in the Prepa E. SHAMBAUGH	ration of the Specialist. George 281
A Further Study of Laryngeal Neo	
The After-Treatment of the Tonsil W	
Primary Mastoiditis? With Notes of	
Young	
Granuloma of the Trachea, with the I	
Abscess of Inferior Turbinal, with BALDWIN	Report of a Case. KATE W. 327
Functional Paralysis of the Acoustic	Nerve. F. Gurney Stubbs 330
The Stapes in Relation to the Tym	
	343
Negative Pressure as a Therapeutic	Agent in Diseases of Nasal Ac-
cessory Sinuses, Throat, Ear and	d Mastoid. E. R. Lewis 346
Chronic Interstitial Otitis or Chronic	Middle Ear Catarrh and Oto-
sclerosis. W. Sohier Bryant.	360
Widening of the Palatal Arch; Its In	nfluence on the Nose and Naso-
Observations on the Surgery of the	
Demonstrations. (By invitation	n.) George Crile 374
Demonstrations of the Removal of F	oreign Bodies from the Trachea
	constration of Jackson's Tubes.
JOHN W. MURPHY	381
Carcinoma of the Larynx; Partial I	Laryngectomy. Chinical Report.
Cavernous Sinus Thrombosis. J. A.	STUCKY
EXHIBITION OF	
A New Apparatus for Administerin	ng Nitrous Oxid and Oxygen.
J. F. Dilligion	394
Instruments (new) of Use in Surg	gery of the Nose and Throat.
Tonsil Knife. A. C. CABNEY	409
Tonsil Dissector. Myron Metzenba	UM
Bismuth Paste Syringe. J. C. BECK	400
Hypodermic Syringe. Otto J. STEIN	
piscus	
PAGE	PAGE
Andrews, A. H319, 345, 359, 363	Lewis, E. R
Baldwin, Kate W329, 371	Louchery, D. C 287
Beck, Jos. C	Pyfer, Howard
285, 290, 304, 341, 358, 364 Brown, J. E325	Pynchon, Edwin286, 313, 363
Bryant, W. S 345, 358, 365, 370	Shambaugh, Geo. E
Davis, J. Leslie 305	290, 320, 339, 344
Dean, L. W288, 311, 320, 372	Sherman, H. G
Holinger, J	Shurly, B290, 303, 312, 325, 329
285, 321, 325, 344, 358, 363, 372	Spohn, Geo. W
Monosmith, O. B	Stein, Otto J
Minor, C. L	Stucky, J. A., 286, 304, 318, 364, 393
Murphy, J	Voung H R 989 319



ADDRESSES.

THE LIMITATIONS OF OPHTHALMIC PRACTICE.

President's Address, Delivered before the American Academy of Ophthalmology and Oto-Laryngology at Its Thirteenth Annual Meeting, held in Cleveland, Ohio, Aug. 27, 28 and 29, 1908.

DERRICK T. VAIL, M.D. CINCINNATI, OHIO.

The history of the development of scientific ophthalmology, embracing as it does a succession of brilliant achievements within the last half-century, would read like a fabulous romance of discovery and adventure in a dark continent. But it is not my purpose to panegyrize nor to dwell on the victorious efforts of those whose work has made the modern practice of ophthalmology possible. The purpose of this discourse is to ascertain, if possible, what rightly constitutes the practice of ophthalmology, what the limitations or boundary lines of ophthalmic practice are, beyond which we need scarcely look for information and within which we may feel we are practicing ophthalmology and not poaching on the preserves of other branches of medical and surgical science.

The subject naturally divides itself into (a) the field of study and (b) the field of practice.

The Field of Study.—The field of study is the same as that for all other branches of medical science—plus an intimate knowledge of the ocular structures. In other words, the ophthalmic surgeon must be a qualified doctor of medicine and surgery who practices ophthalmology. This course is necessary because of the fact that there is at least an indirect connection between the eye and every organ and working part of the entire human organism. It is also necessary for the oculist to be well posted in allied or collateral sciences, such as climatology, hygiene, sociology, physics, psychology, evolution, heredity, race, diet, habits, occupation, plant-life, germlife, etc. So that by a short process of reasoning we come to the conclusion that the field of study for ophthalmology embraces the heavens above, the earth beneath and the waters under the earth and all that in them is.

The Field of Practice.—The field of practice naturally embraces the various therapeutical and surgical procedures in vogue for correcting the diseases and anomalies that affect the eye alone. That brings us to the study of what rightly constitutes the "eye alone."

The eye is the organ of vision, by which we do not mean the eyeball alone, for that, as we well know, is only the distal end of the organ of vision; we mean every part of the apparatus by which we see. This must of necessity include all the structures which are directly concerned in the act. It includes the orbital contents, the bony walls of the orbit, the optic tracts, the nerves furnishing the impulses called sensation and motion, their origin, course and distribution, the arterial, venous and nerve supply to and from these several structures and the knowledge of the pathways of vision from the retina to the brain cortex and back again.

If we look into the subject we soon convince ourselves that scarcely any one nowadays practices within the narrow confines of the eve alone. If we find a case of neuroretinitis or retrobulbar neuritis, we find ourselves inquiring into the systemic causes for these diseases, for we can not successfully correct the diseased processes without correcting the causes as they exist within the body. This takes us at once within the domain of the internist, for we must have a good knowledge of systemic diseases in order to interpret and successfully manage the local disease. Many ocular diseases are the local expression of blood disorders, something in the blood stream which finds in the delicate capillary system of the retina and chorioid a suitable nidus for setting up a diseased process, such as in malaria, pernicious anemia, etc. This implies a knowledge of the blood and at once renders the oculist to a certain extent a hematologist. The blood circulating in the eve must draw its supply from the common blood stream which supplies nutrition to the rest of the body. The blood, having been oxygenated in the lungs, filtered in the kidneys, renewed and reinforced by the bloodmaking organs, correctly treated and supplied by the various constituents from the ductless glands of the body, as regards the suitable chemical and biologic properties and supplied newly and in well balanced proportion at all times, that which has been burnt up and swept away by tissue metabolism, is the same blood that permeates the tissues of the eye.

It is therefore true that a diseased process set up in any important organ of the body will at least cast a reflection in the eye, where the sensitive and delicate capillary membranes such as the iris, retina and chorioid are visible to the eye of the observer, as is true in no other capillary tissue in the body. Thus it is that we look into the eye and diagnose Bright's disease, uremia in the pregnant woman, tuberculosis, cerebrospinal meningitis, brain tumor and abscess, diabetes, etc. We should know the signs of these ailments as expressed in other parts of the body and search for them, thus encroaching, so far as the examination goes, upon the domain of the general practitioner. We have a right to know what causes the ocular disease and should let no case of retinal exudation or hemorrhage, optic neuritis or motor paralysis go unexplained. Other diseases as expressed in the eve are the local expression of a disease affecting the cerebrospinal nervous system. I refer to the various palsies affecting the eve muscles, singly or in groups. Atrophies of the optic nerves dependent on general nervous degeneration or degeneration of certain tracts of the spinal cord, neuritis dependent on toxic and toxemic conditions which are operating in the system, are diseases which properly belong to the neurologist, but they often first come to us because the ocular symptoms are the first noticed, and we should be conversant with the systemic expression of these diseases in order that we may find corroborative evidence to substantiate our diagnosis. In other words, we should be well up on neurology in order to understand and correctly advise in the cases of ocular disease dependent on general nervous diseases.

Owing to the fact that nearly all forms of conjunctivitis and many maladies affecting the glandular and tear drainage apparatuses are directly due to germ life and also to the fact that the various tumors, malignant and benign, which are found in and about the ocular structures, are of such nature that a correct diagnosis can not be made without laboratory methods and an intimate acquaintance with the microscope and what is revealed by it, and also because of the fact that the pathological processes affecting the ocular bulb and other structures are only understood when the specimen finds its way through a well regulated pathological laboratory, it becomes nowadays a matter of necessity that the oculist should be a laboratory man. The day is at hand when the oculist who is doing his duty by himself and his patients must have his own laboratory, or at least a hospital laboratory available, where he will trace the active cause or study the result of disease. The field of practical ophthalmology contains within it the need of a properly equipped laboratory and the oculist should cultivate this much neglected department of science in order that he may be intelligent and expert in his work and give his patients the best service. It is true that we can not all become pathologists; the fact is that but few can do so, but it is necessary in this day and age for each one of us to know the principles of the subject and have a good understanding of germs and germ life, as well as a familiar knowledge of the histology of ocular structures and the behavior of the ocular tissues when affected in the various stages of disease and inflammation.

Embryologically considered, the eye is an outgrowth of the brain and after full development it retains in more or less restricted ways direct connection with the cerebrum through the second, third, fourth, fifth, sixth and seventh nerves; likewise with the spinal cord through certain cervical nerves. The arteries which supply blood to the eves and adnexa and branches of the carotids, which supply most of the blood circulation in the head, face and neck, and while the arterial blood stream is only in one direction—away from the heart, always passing forward toward the capillary terminals, and never backward—yet the blood passing through these channels is drawn from the common stream. The venous circulation begins where the arterial ceases and carries the darkened and effete blood backward along channels constantly increasing in size. The venous blood from the evelids, orbits and eyeballs admixes with that from the nasal chambers, scalp, meninges, face, ear, throat, skull bones and face bones, their diploic and pneumatic spaces. and finally passes down the jugulars in the cava-descenda to the right heart. The lymph stream, commencing where the capillaries exist in the eyelids, eyeball and orbital tissues, finds its way to other destinations in lymph glands, variously located about the ears, pharynx, neck and throat, these glands being likewise the receiving stations for lymph en route from all the various organs and anatomical structures of the head, face and neck.

The nerves furnishing impulses of sight, feeling, motion, secretion and nutrition to the various ocular structures are so intimately connected by intercommunicating fibers in the brain, likewise by an abundant interassociation in the various nerve ganglia inside and outside the skull cavity with other outlying structures, such as the ear, nose, face, scalp, neck and throat, that it is impossible to consider the one without considering the other.

From this desultory and cursory survey of the sanguino-lymphonervo connection that exists between the eye and other structures of the head and neck, it is patent that the legitimate field of the oculist is at least not the orbital contents alone, for how can he, knowing these structures to be so woven together that there is not the warp and woof of the most cunning loom that the ingenuity of man has achieved or dreamed of devising that compares with it, how can he separate the eye tissues from the adjacent tissues as if an impervious wall separated them, and cling to the hallucination that he can successfully practice ophthalmology and never look into the nose, never examine into the ear, never consider the throat, ignore

the blood, disclaim any knowledge of physical diagnosis and boast of his ignorance of anything and everything except the organ of vision alone? The presence in our libraries of volumes on such subjects as "The Eve and the Nervous System," "The Eve in Relation to General Disease," "The Eve and the Accessory Nasal Sinuses." "The Eve and the Brain," etc., proclaim in silent but unmistakable terms that our periscopic vision has widened and that we are physicians first and oculists next. The trend of modern literature on ophthalmology is growing rapidly toward a broader and more universal knowledge of the subject. I hope to see the time when ophthalmology will be taught in this country as it should be taught. That day will come when we, as oculists, demand that a certain amount of preliminary education and training be enforced before a man may be licensed to practice ophthalmology. It should be no longer possible for a man to be called an oculist by himself or by the laity, after he has spent a month or six weeks in some postgraduate school or after serving as assistant for six months or a vear in some oculist's office. It is a blot on our fair escutcheon that any man be so regarded after such short courses of attendance in any postgraduate school or even after six months' service without the proper preliminary training. When we require students to qualify by years of study in general medicine or by a year or two of experience as an interne in a general hospital and then, after a sufficiently long time of service in an ophthalmic institution in America or abroad, he should be permitted to appear before a proper examining board, similar to any State Board of Examination and Registration, for examination and if he is found competent let him then be permitted and licensed to practice ophthalmology.

But to return to our subject, we should draw a sharp line between the study of ophthalmology and the practice of ophthalmology. The study necessarily includes every bodily ailment that has its ocular phase, and the practice should include the various surgical and therapeutical measures directed toward the cure of the abnormal ocular condition. The oculist has a singular opportunity for diagnosing systemic conditions on account of the ofttimes infallible ocular signs of such diseases present, and as soon as possible he should refer the case over to the physician with full report of what he has found.

The general practitioner nowadays shows a very kind attitude toward the specialist, especially if he works with him and not against him. And really the general practitioners should feel grateful toward well-behaving specialists for the existence of a class of men who limit their practice to a specialty, removes from the

ranks of general practitioners a large number of able men who, if they practiced general medicine, would make vast inroads into their Moreover, much of the rapid advancement of medical learning has come from the work of the specialists in the various departments. Whether the oculist has the right to practice other specialties, such as the nose, throat and ear, is a question for each man to decide for himself. The relation between the eve and the nose has recently become appreciated to a degree that it would seem to be the duty of the latter day oculist to understand this relationship and to be prepared to practice in the nose if he expects to afford his eve patients the relief they seek and have a right to expect. The rhinologist has a right to view the situation differently from his side, since the cases which go to him usually have no eve symptoms. Patients with eve symptoms do not usually go to the rhinologist and nose cases usually do not go to the oculist. field of ophthalmic practice is changing to include the nose; this is true, whether we would have it so or not. The rhinologist and otolaryngologist may likewise see his field broadening to include territory which a short while ago seemed to lie outside of his legitimate field of practice.

Between the eye and the ear there is not so intimate an association as between the eye and the nose, and yet we have ocular signs of otitic diseases; that includes palsy, strabismus, nystagmus, lagophthalmus, optic neuritis and neuroretinitis, thrombosis of the retinal veins, irregular pupillary behavior and many others. Between the throat and the eye there is but slight connection except in a few instances, e. g., adenoids and phlyctenular and catarrhal conjunctivitis.

In closing I would enter a plea for a broader field of study for oculists, which carries with it somewhat wider limitations of ophthalmic practice.

LIMITATIONS OF OTO-LARYNGOLOGIC PRACTICE.

VICE-PRESIDENT'S ADDRESS.

JOSEPH C. BECK, M.D. CHICAGO.

A few years ago one could have answered this question very easily by enumerating the various conditions commonly treated within the nose, pharynx, larynx and ear, but in recent years, particularly since the Schwartze operation instead of the Wilde incision, and the radical mastoid for the cure of chronic suppuration of the middle ear, have been performed by oto-laryngologists, this special field has gone beyond these confines. Slowly but certainly have they advanced, and to-day modern oto-laryngology comprises the capital operations of the head and neck.

There still exists considerable hesitation in our ranks regarding this progress and extension, feeling the possible danger of encroachment on the field belonging to the general surgeon. This, however, I believe to be a mistake, because there is a natural association between the affections of the cavities of the nose, throat and ear and their adnexa. Consequently the modern oto-laryngologist should not be satisfied to confine himself to the treatment of cavities, but should also include the adnexa and the complications.

On the other hand, the limitations of oto-laryngologic practice is entirely an individual matter; one may confine himself to the treatment of the nose and throat, while another will treat only the ear, another will treat them all, another only conditions within the cavities, and some will treat internal as well as external diseases of these structures, nay, go beyond and treat the structures intimately associated with them. I wish to commend the latter class, and herewith give my reasons by citing some specific conditions.

First.—Let us take a case of nasal obstruction in which a diagnosis of fibrosarcoma is made. It involves the entire half of the superior maxilla, and it is necessary to do a temporary or permanent resection of the superior maxilla with or without ligation of the carotid artery. It has been the practice to call in a general surgeon to do this operation, which I claim is entirely within the domain of oto-laryngologic practice.

Second.—An acute or chronic accessory sinus affection develops definite brain symptoms; a diagnosis of brain abscess or meningitis is made as a complication. The rhinologist has performed the intra- and extra-nasal operation on the sinuses, but the exploration of the brain or puncture of the spinal canal has been left to the general surgeon. There is no reason why the complete operation should not be performed by the oto-rhino-laryngologist.

Third.—The many varieties of external nasal deformities have been and many are still being performed by general surgeons, not-withstanding the fact that in most cases intra-nasal surgery is required also in order to obtain the very best results. It is, therefore, clear that these cases belong to the care of an oto-rhino-laryngologist.

Fourth.—The lips, gums, jaws, palate, salivary glands and ducts, cheeks and tongue are being treated in a miscellaneous manner, some by the general surgeon, some by dentists or what are known as oral surgeons or stomatologists, and some by the rhino-laryngologists.

I wish now to mention some specific pathological conditions of these structures: (a) Of the lips—harelip, congenital staphyloma, neoplasms, inflammatory diseases and angioneurotic edema. (b) Of the gums and jaws—epulis and other neoplasms, paradental and dentigerous cysts, fractures and dislocations, periostitis, abscess and necrosis. (c) Of the palate—cleft palate and other congenital defects, paralysis, neoplasms and inflammatory diseases. (d) Of the salivary apparatus—salivary calculi and cysts or ranulæ, inflammation, abscess and neoplasms of the gland proper. (e) Of the cheeks—leukoplakia, neoplasms and inflammatory diseases. (f) Of the tongue—black tongue and other keratoses, tubercular and syphilitic diseases and other inflammatory affections, congenital shortening or abscess of the frenum, otherwise known as tongue-tie, neoplasms.

Fifth.—In recent years it has been clearly shown, especially by Groeber, Moos, Wood and others, that lymphatic structures of the mouth, nose, nasopharynx, pharynx and larynx drain into the various glandular regions of the neck, and their enlargement or infection is in direct proportion to the infection of these lymphoid structures within the cavities. Conversely, with the clearing up of the primary infection will the glandular disease disappear. It, therefore, becomes clear that enlarged lymph glands, no matter from what source, those that drain the above-mentioned lymph structures come within the scope of the management of the oto-rhino-laryngologist. It is not at all rare to find cases of glands of neck that have been enlarged for some time—if they have not as yet suppurated—disappearing as soon as the tonsils or adenoids are removed. It is also not rare to find recurrence of the enlarged

glands of the neck after they have been removed, sometimes two or three times, only ceasing to return after the tonsils or other infected structures within the cavities have been removed.

Sixth.—A very frequent complaint of difficulty of swallowing and breathing, as well as other sensations referable to the throat, is due to the enlarged thyroid gland. Pressure on the recurrent laryngeal nerve may produce paresis or paralysis of the vocal cords. This pathological condition is rationally within the limits of our specialty and should receive attention more frequently by us than it does. The same may be said of any tumor of the neck, as also branchial cysts when they produce symptoms referable to the nose, throat or ear.

Seventh.—The various external operations on the larynx have practically all been performed by laryngologists in the past ten years. All I wish to say in this regard is that this goes to show their ability to perform these most difficult capital operations.

Eighth.—The trachea, bronchi, lungs, esophagus and stomach, in so far as examination and treatment by means of the various scopes (tubes) are concerned, are certainly within the limits of our specialty and open a great field for advanced work.

Ninth.—The many operations on the external ear, as plastics and removal of neoplasms, have for some time been performed by otologists with excellent results.

Tenth.—The manifold complications of a mastoid infection, such as sinus thrombosis, thrombophlebitis, brain abscess, abscess of neck secondary to Bezold's variety of mastoiditis, and meningitis, have likewise been mastered by the oto-laryngologist and have raised our standard considerably.

Eleventh.—The neuroplastic operation for the cure of facial paralysis has in the majority of instances been performed by general surgeons, notwithstanding the fact that the majority of cases are either associated with severe lesions of the temporal bone or due to our effort to cure suppurative ears. Speaking from personal experience, I wish to urge every otologist, when he finds himself confronted by this unfortunate and most unhappy condition, to do this delicate, difficult but interesting surgical procedure.

I have now mentioned mostly surgical affections, because to go into the subject any further would take up too much time; besides, it will be understood that other local or general measures will be employed as necessary.

Now, gentlemen, that I have enumerated the most important conditions that modern oto-rhino-laryngologists must be prepared

to treat, I wish to give my reasons why they have the advantage by so doing:

- 1. From the nature of the fact of constantly being trained to manipulate delicate structures, it is natural that their results should be better.
- 2. In many of the mentioned operations, as the cleft palate, mouth, etc., reflected light by means of the mirror is necessary, and only those constantly trained to handle the mirror can do the best work.
- 3. By confining his work to the surgery of the head and neck, especially to this limited field, he naturally becomes an expert, whereas those that have the entire body to take care of will most likely not have the opportunity to observe as many cases. Of course, this will be qualified by the number of cases any one sees.
- 4. As said in the beginning, the oto-laryngologist should treat not only the primary lesions, but also the adnexa and complications. All they have to do is to get perfected in the technic and know well the surgical principles, because the anatomy, physiology and pathology have always been well known to them.

I have said nothing in regard to the oto-rhino-laryngologist and ophthalmologist or the diseases that will be found in both departments, because the president has already alluded to it. I would, however, like to say that the oto-rhino-laryngologist can scarcely do without the cooperation of an ophthalmologist, and vice versa.

THE ETIOLOGY OF CHORIOIDITIS.

J. B. LAWFORD, F.R.C.S. LONDON, ENGLAND.

Mr. President, Ladies and Gentlemen:

It was not without considerable misgiving that I accepted the invitation to deliver an address in the Ophthalmological Section of this Academy.

While I was deeply appreciative of the honor offered to me, as an individual, and also as a representative of Moorfields Hospital. I was equally if not more conscious of the responsibility incurred by my acceptance.

I regret very much that the time at my disposal for the preparation of an address was so limited; much more limited than the occasion deserves; June and July are busy months professionally, in London, and but little leisure was available to devote to my task. I, at least, am painfully aware how far short of my intentions are the results of my endeavors.

As a subject I have chosen one, "The Etiology of Chorioiditis," which you will readily admit can not be dealt with "in toto" within the limits of an address and I have no intention of attempting impossibilities.

When I submitted the title to your president he very kindly replied that in his opinion the subject was a suitable one, for, said he: "We need to be enlightened on the etiology of chorioiditis."

Well, sir, I should like to assure you at the outset that I have not come prepared to disperse all the obscurity surrounding this subject. My endeavor is cast in a much humbler mold. I wish to address you briefly upon, what appears to me, some of the more important points concerning the etiology of chorioiditis; to allude to recent additions to our knowledge on this subject, and to indicate some of the lines of enquiry which seem to me most likely to be fruitful. My remarks, therefore, will be essentially non-dogmatic, but may, I trust, prove suggestive, even if not wholly instructive.

Time will not permit, nor would the occasion justify any attempted classification of the causes of chorioiditis, nor the presentation of many details such as clinical and pathological notes, the records of experimental investigation, etc., all of which have an interest of their own. I propose to deal almost wholly in generalities and to avoid laboring my address by frequent reference

to the many authorities I have had occasion to consult. I shall begin with a little bit of history, part of which at least is reminiscence.

I intend to omit from consideration disease affecting the anterior part of the uveal tract (iris and ciliary body), although it is becoming increasingly doubtful if our somewhat artificial division of the uveal tract is altogether desirable from the pathological standpoint.

I imagine that I shall not be very wide of the mark in suggesting that to most of us in our student days, certainly to all those who began their professional studies twenty-five or more years ago, the query "What are the causes of chorioiditis?" was one of a somewhat limited number of questions which we felt quite prepared to answer. At that time the list of diseases known or believed to stand in causal relation to chorioiditis was so small that no "memoria technica" was required even by the most forgetful of students.

In the preopthalmoscopic days and for some little time after Helmholtz's epoch-making discovery, inflammation of the chorioid was scarcely recognized as a clinical entity. If we consult treatises on diseases of the eye, of the first half of the nineteenth century, by authorities such as Saunders, Mackenzie, von Ammon, Stellwag, Desmarres and others, whose writings have become classical, we find under the heading of chorioiditis, divers descriptions of symptoms, which, if read in the light of our present knowledge, generally suggests a diagnosis of glaucoma. In fact, some of the most careful observers and most erudite of authors at that time used the terms acute chorioiditis and acute glaucoma as synonyms. Tyrrell in 1840 wrote: "Chorioiditis in the acute or chronic form is not very uncommon, but it is not always recognized and is indifferently understood."

The causes of a disease so little understood were necessarily almost wholly matters of surmise. "Injuries, extension of inflammation from neighboring structures, disturbances of general health, gout, etc.," were those most commonly enumerated.

When we contemplate the difficulties under which surgeons of that time labored and remember how restricted were their means of examination of the eye, we can, to some extent at least, comprehend the limitations of their knowledge.

It is a curious fact that though the surgeons of that day were well acquainted with syphilitic iritis, they seem to have paid little heed to syphilis as a possible cause of inflammation of the deeper parts of the eye. So careful an observer as Mackenzie does not mention syphilis as a cause of retinitis or chorioiditis.

From this period of surmise and hypothesis, when subjective symptoms and external signs, if present, were the only available means of diagnosis, we pass almost abruptly to that happier time, when by the aid of the ophthalmoscope the evidence of disease of the chorioid became visible.

At this time (between '55 and '60) when the use of the ophthalmoscope was becoming general and the causal connection of syphilis to chorioiditis was recognized, under the rapid spread of this knowledge other possible causes of the disease were speedily forgotten, or at least treated with scanty consideration. For a period of twenty-five years, or longer, syphilis as the origin of chorioiditis dominated the medical world; writers of that era scarcely mentioned other possible causes, though the more experienced and cautious among them added the statement that in a "considerable proportion of cases no ascertainable cause existed." It is an interesting, almost a startling fact, that a similar proviso is necessary at the present time. In the 1908 edition of Fuchs' text-book, one of the most valuable and authoritative of treatises on ophthalmology, we find as the concluding sentence upon the ctiology of chorioiditis, these words: "In many cases the cause remains obscure." So that in spite of the great advance in our knowledge, we can not vet claim to have arrived at a complete understanding of the causes of chorioidal disease.

During the ninth decade of the last century, doubt began to arise, or, more correctly, began to be expressed as to the sufficiency of the prevalent belief concerning the etiology of chorioiditis and evidence in favor of broader and more inclusive views began to accumulate.

Among the earliest to give expression to doubt was that astute clinical observer, Jonathan Hutchinson, whose name is so closely associated with the various ocular manifestations of syphilis.

In an address on "Chorioiditis Disseminata" in 1887 he stated that "in early days he had been led to think that nearly all chorioidal disease was of syphilitic origin. For some years he had entertained doubts and had been seeking evidence as to whether there were cases which were not syphilitic in origin and if it were possible to discriminate them. He had, however, no doubt that syphilis was the cause of a large majority of cases of chorioidal disease."

During the last ten or twelve years, even if we judge by the literature of the subject alone, there has been a decided change of

opinion. This has been shown in the recognition by all recent writers of the possibility, indeed the probability, of a much more varied etiology of chorioiditis than had previously been taught or accepted. I gladly avail myself of to-day's opportunity to plead for a more thorough enquiry into the origin of disease of the chorioid, especially in all cases in which its dependence upon syphilis can not be clearly proved. I think that, at all events until recently, many of us have been too ready to accept without qualification the dictum that the discovery of chorioiditis, especially of the disseminate type, is tantamount to the discovery of syphilis. This attitude, which was well described by Dr. Hiram Woods (in a paper read before the American Medical Association) in these words, "Lesions of the chorioid suggestive of syphilis too often excite doubt as to the history rather than stimulate research for less common causes," is one which should now be wholly abandoned. It is not easy to comprehend why we have been so tardy in accepting the liability of the chorioid to attack by the virus of diseases other than syphilis, many of which are as truly systemic in character. It would, I think, be strange if a structure like the chorioid exhibiting, as we know, a marked susceptibility to the syphilitic virus, should possess even the semblance of unanimity to the activities of all other diseases of an infective nature. I have been convinced for some years that we ought to widen the basis of our enquiries and investigations concerning the causation of chorioiditis in its numerous forms. It is, of course, true that in not a few instances the most careful and thorough enquiry fails or has failed to explain the chorioidal disease. But such enquiry and investigation, if persistent, will ultimately succeed.

As medical men, we live in fortunate times, although we do not invariably realize the fact, or make the best use of the opportunities offered us by the twentieth century. There has never been a period in the history of medicine, when so many means of determining the nature of disease have been available. Signs and symptoms have always existed ready for interpretation. Now we are able to call to our assistance in diagnosis new and improved methods of examination of living tissues and of secretions and excretions, and the employment of various chemical, clinical and pathological tests (e. g., the different tuberculin tests). It is in the highest degree probable that these supplemental methods of diagnosis will soon become more widely applicable as well as more reliable.

There are good reasons for accepting the view that all forms of chorioiditis (excluding the traumatic variety and that caused

by extension of inflammation from adjoining tissues) are due to infection reaching the chorioid in the blood stream. The blood is the vehicle which conveys to the chorioid the phlogogenic material whatever its exact nature, which is capable of lighting up inflammation.

If the infection is mild, as is frequently the case in syphilis and tubercle, the virus does not spread widely from the blood vessels; localized endovasculitis is set up; round these foci, areas of inflammation develop and the chorioiditis is desseminate in type; if the infection is severe, as, for example, in pyemic conditions, the septic material is too virulent for its effects to be limited to certain blood vessels and their immediate neighborhood, inflammatory changes spread throughout the tissue and a diffuse chorioiditis results.

Recent investigations¹ concerning endogenous infection of the eye seem to show that the posterior part of the eyeball offers more favorable conditions for such processes than does the anterior part, and that the most serious forms of endogenous infection develop from the penetration of micro-organism into the posterior segment of the globe.

If the foregoing statements be even approximately correct, are there not infinite possibilities regarding the etiology of chorioiditis, and is it not incumbent upon us to be fully alive to these possibilities?

A judicial survey of our present knowledge concerning the etiology of chorioiditis renders it clear to the enquirer that within certain limits our information is precise and definite and reliable, but that beyond these boundaries our knowledge is as yet indefinite and very incomplete.

It has been proved beyond all question that syphilis, both inherited and acquired, is a common, indeed by far the most common, cause of chorioiditis, and I need not occupy time by dwelling upon a fact so well established. But before leaving this part of the subject, may I direct your attention for a moment to the protean character of the chorioidal manifestations of syphilis, especially in the acquired form of the disease, and express the opinion that much caution should be observed in making a diagnosis, either positive or negative, from visible chorioidal lesions alone? It is a truism to say that certain forms of chorioidal disease are strongly suggestive of syphilis and that others are less so, but most ophthalmic surgeons are cognizant of cases of chorioiditis of the familiar disseminate

^{1.} Selenkovski, Westnik Ophthalmol: T. XXI, I.

type (formerly considered as almost pathognomonic of syphilis) in which, neither from the examination of the patient nor from the investigation of the personal and family history can any evidence be obtained to support the diagnosis of lues.

On the other hand, we not infrequently see chorioidal lesion of unusual and unfamiliar type whose dependence upon syphilis is (sometimes unexpectedly) established by a convincing history or by the discovery of characteristic lesions elsewhere.

The remote action of syphilis in the causation of chorioidal lesions should be borne in mind. The vascular changes in the form of widespread arteriosclerosis which are so well known in the late stages of syphilis and which are among the most serious results of that fell disease, not infrequently lead to chorioidal changes of a degenerative type. The results may be widespread when due to a generally diminished blood supply and consequent starvation of tissues; or may be limited in distribution when consequent upon blocking vessels in localized areas in the chorioid.

Belief in the etiological relation of tubercle to chorioiditis has become widespread in the last few years. Indeed a recent author, Venneman, the writer of an able article upon disease of the chorioid in the Encyclopédie Française d'Ophthalmologie, expresses the opinion that there has been a tendency of late to consider tubercle as the predominant cause of chorioiditis; a view to which he does not subscribe. He says: "When syphilitic infection is denied and there is no clinical evidence thereof, we, too, readily assume the existence of a hidden focus of tubercle. . . . Even if our patient is perfectly healthy in appearance, we do not hesitate to believe in some bronchial, mediastinal or mesenteric gland full of living bacilli, or of dormant spores. We should do better, I think, if we returned to the views of our predecessors and recognized other blood disorders capable of preparing the ground for inflammation of the chorioid, even if we do not accept their power of exciting the inflammation." As we shall see, Venneman believes that tubercle is one of the causes of chorioiditis, but is unwilling that such belief should render observers oblivious of other causes.

Infection of the chorioid during the course of tubercular meningitis and other forms of acute tuberculosis is a well-established pathological fact and may be passed by without further comment. Our knowledge of the connection between tubercle and varieties of chorioiditis occurring independently of acute fatal tuberculosis is much less definite, and to this comparatively little known subject I desire to direct attention.

A large number of observations, both clinical and pathological, concerning tubercle and its relation to disease of the uveal tract are to be found in the medical journals of the last decade, and especially of the latter half of that period (see bibliography). I do not propose to weary you with detailed reference to these papers, most of which I have consulted. They are with few exceptions valuable contributions to our knowledge and worthy of study.

The evidence which has been accumulating during the last few vears goes far to show that chorioiditis of varying type, and both diffuse and circumscribed, may result from tubercular infection. Some recent authorities (notably Venneman² in Europe and de Schweinitz³ in this country) have spoken with no uncertain voice on this point. Venneman says: "It appears to me absolutely certain that tubercular infection can excite inflammation of the chorioid," and de Schweinitz, in an interesting paper published two years ago, speaks of "the fact now well established that a very considerable number of cases of ordinary disseminated and diffuse exudative chorioiditis, and rarely, localized chorioiditis are due to tuberculosis." I quote the words of these two writers because they seem to me weighty statements and worthy of our best consideration. While I am fully convinced that tubercle is a cause and perhaps a common cause of chorioiditis, I feel that we have not as vet sufficient information to enable us to define its relation to the more common varieties of chorioidal inflammation, such as the familiar disseminate form, as clearly as we can in regard to syphilis.

All, or nearly all, ophthalmic surgeons have seen cases of inflammation of the chorioid undoubtedly tubercular in origin; such cases are usually examples of severe but localized inflammation. Some years ago von Michel advanced the opinion that chronic chorioiditis with all the character of the ordinary disseminated form might be tubercular in origin, but the evidence then adduced can hardly be said to be conclusive. Personally, I have not yet been able to prove the tubercular nature of disseminated chorioiditis of the usual type, in cases in which syphilis as a cause could be excluded, and I am not aware of the record of such a case. I think there are good reasons for suspecting many of these unexplained cases to be tubercular, but suspicion is not proof, and until satisfactory evidence is forthcoming we must reserve judgment.

We are, however, quite justified in the general statement that tubercular infection is a cause of chorioiditis. This fact, in my

^{2.} Encyl. Francaise d'Ophthal. Vol. 6.

^{3.} Annals of Ophthal. Vol. 15.

opinion, is one of great and increasing importance, not only in reference to diagnosis, but also in relation to prognosis and treatment. The means for the detection of tubercle in man are now so easily available and under improved methods are becoming so reliable that the diagnosis of tubercular chorioiditis may before long become more certain than that of any of the other forms of disease of this structure.

Even with this comforting thought of help in diagnosis, we should not fail to recognize that our knowledge concerning tuber-cular chorioiditis is at present very imperfect, especially from the clinical side, and that further and more precise information is urgently wanted. We want evidence from cases carefully observed and thoroughly investigated, and evidence such as can be obtained only from collective enquiries. For example, we have no reliable information at present as to the comparative frequency or infrequency of tubercular chorioiditis; we do not know if there are types of disease which may be considered more or less characteristic, or whether symmetry or asymmetry is the rule.

These and other doubtful points require elucidation; may I commend them to you as fit matters for enquiry.

In order not to weary you I propose to pass by, with merely a word of reference, a number of diseases, all of which have been shown to be at times associated with chorioiditis. Such are—enteric fever, malaria, several of the exanthems, influenza, systemic gonorrheal infection, many of the anemias, gout. Some of these, e. g., enteric fever and influenza, may, with little if any doubt, be included in the category of causes of chorioiditis; concerning the others, we have as yet very scanty information.

I would also allude here to the possible connection between certain occupations and the occurrence of chorioiditis. A paper has been published recently containing the record of a case of chorioiditis in a man who was a worker in naphthalin; the chorioidal lesions and the clinical symptoms of central defect of vision and concentric narrowing of the field of vision were attributed to the poisonous effects of naphthalin.⁴

One of the most interesting questions which arise during the consideration of the etiology of chorioiditis, and one which opens an almost unlimited field of enquiry, is that of the relation which certain toxic and septic conditions bear to inflammatory lesions of the chorioid. The importance of these toxic conditions as causes of chorioiditis has only recently been recognized, and has, I think,

^{4.} Van der Hoeve. Arch. f. Augenheilk. 56 p. 259.

received more attention in this country than elsewhere. Several well-known writers, among whom I may mention Charles Stedman Bull and de Schweinitz in America, and Elsehnig in Germany, by the publication of observations and records of cases, have brought this subject forward, and it is one to which attention may profitably be directed.

The toxic conditions to which I refer are chiefly those which result from the ingestion of poisons of the ptomaine group, and from varieties of autointoxication, this latter term being used to designate the conditions induced by poisons which are manufactured in the tissues of the individual. Such toxins may be derived from collections of septic material, e. g., boils, abscesses, pyorrhea alveolaris, and other purulent foci, or may originate in the products of metabolism in the tissues of the individual. Such products may be noxious because metabolism is faulty, as is generally the case, or because with normal metabolism, they accumulate in poisonous quantities.

Although we are well aware of the general symptoms of poisoning often induced by the action of these toxins, we have but scanty knowledge concerning the local effects, including ocular lesions, to which they may give rise.

Moreover, we have as yet very little information regarding the exact nature of the poison or poisons which the living tissues are capable of producing. So far as I know the identity of the toxins which induce autointoxication has not yet been established.

Toxemias originating from the products of faulty metabolism are probably in the majority of instances intestinal in origin, but we are frequently unable to determine the source of the toxins. It is, however, fairly certain that the products of intestinal putrefaction, whatever their exact chemical or microbic characters may be, are important factors in the causation of inflammatory changes in distant tissues, among which the chorioid must be reckoned.

The effects of autointoxication upon the eye are more generally known (probably because of their greater frequency) as iridocyclitis than as chorioiditis. Elschnig has shown that in a certain number of cases disease of the uveal tract (irido-cyclitis and relapsing iritis) is associated with and probably dependent upon intestinal decomposition, and he suggests that the same statement may be true of chronic chorioiditis, but that "convincing observations on this point are wanting." De Schweinitz in commenting on Elschnig's paper says: "It appears to me from my own experience and that of my colleagues that cases are accumulating in which various types, chiefly of plastic chorioiditis (localized), and some-

times disseminated chorioiditis, must be attributed to an inflammation which is derived from a disordered gastrointestinal tract either as an autointoxication or an autoinfection." On the other hand, Venneman states that chorio-retinitis due to intestinal autointoxication always begins as an iritis.

A paper by de Schweinitz, presented to the American Medical Association two months ago, is a valuable contribution to our knowledge on this little-known subject. It contains, as many of you are aware, the record of almost ideal clinical and laboratory examinations of cases in which ocular disease was associated with evidence of autointoxication of gastrointestinal origin.

Concerning acute chorioiditis occurring as a result of septic or toxic conditions, we can speak with less uncertainty. A small number of cases of severe and acute forms of chorioiditis due to toxic material originating in the intestinal tract or elsewhere are on record. Among the most noteworthy are those published by Charles Stedman Bull⁵ and Holmes Spicer.⁶

Bull has given us a very careful report of two cases in which severe chorioiditis was caused by toxemia of gastrointestinal origin. Spicer's case was one in which metastatic infection of the chorioid occurred, the source of infection being an abscess in the skin. In this instance the staphylococcic nature of the infection in the skin and in the chorioid was demonstrated by microscopic examination.

We may, I think, accept the statement that there is already sufficient evidence to prove a causal connection between toxemia, resulting from autointoxication or autoinfection and inflammatory lesions in the chorioid. Moreover, I believe it to be very probable that this causation of chorioiditis will be shown to be more frequent than is at present recognized.

If the observations previously referred to, regarding the relation between the activity of the virus and the form of chorioiditis which results from invasion, be correct, there is no obvious reason why mild and chronic, as well as severe and acute forms of chorioidal inflammation should not be met with as a result of the poison developed in cases of autointoxication.

The association of chorioidal lesions with disease of various important internal organs, e. g., the liver and kidneys, has been occasionally noticed and recorded, and the question has naturally arisen as to their exact relationship. While, from the evidence available, I do not think we can claim that a causal connection between disease of these or other organs and chorioiditis has been established, a

^{5.} Trans. American Ophthal. Soc. 1905.

^{6.} Trans. Ophthal. Soc. U. K., 1907.

certain number of observations are on record which tend to show that the association is more than accidental. The question is not altogether an easy one to decide. Even if it can be shown that the association is usual, it may be difficult to determine whether the disease of the organ affected and the chorioiditis are to be considered cause and effect, or to be regarded as owning a common origin. To give an example, chorioidal lesions have been noted in cases of chronic nephritis; in such instances it is probably more correct to say that the morbid condition in the kidney and chorioid are both secondary to vascular degeneration, than to regard the chorioiditis as induced by the renal disease.

It appears to me that analysis of some reported cases on these lines will leave us in doubt whether it is desirable in the present state of our knowledge to use the terms renal chorioiditis and hepatic chorioiditis, at least without qualification.

Chorioidal changes associated with disease of the liver have received a good deal of attention from several recent writers in Europe, more especially Baas in Germany. This observer has described a variety of chorioiditis met with in cases of cirrhotic disease of the liver to which he has given the name hepatic chorioiditis; the condition so described has been accepted as a pathological entity by the writer responsible for the article on disease of the chorioid in the Enclyclopédie Française d'Ophthalmologie and at least deserves further investigation. However, so careful an observer as de Schweinitz has been unable to satisfy himself of the occurrence of a form of chorioiditis which can be considered specifically hepatic in origin.

The subject of chorioiditis associated with disease of particular organs and the exact relations of the two pathological conditions constitutes one of the numerous lines of enquiry to which I referred in an earlier part of my address. Although it does not appear to me as promising a line to pursue, or as likely to prove helpful in the elucidation of the etiology of chorioiditis as others to which I have previously alluded, it should not be forgotten in our search for that increase of knowledge which will enable us to clear up much of the obscurity at present surrounding the subject we have had under consideration.

Now, gentlemen, I must not further tax your patience. I have in mind the lines by Pope: "Words are like leaves and where they most abound much fruit of sense beneath is rarely found," and I should deeply regret if I gave you cause to quote them.

BIBLIOGRAPHY.

Venneman, Encylopédie Francaise d'Ophthal., Vol. 6. Galezowski, Recueil d'Ophtal., 1905. Stock, Arch. f. Ophthal., Bd. 66, 1907. Schleich, Deutsche Med, Wochenschr., 1906. Distler, La Clinique Ophtal., 1905-6. Valude, Recueil d'Ophtal., 1906. Pechin, Soc. Francaise d'Ophtal., 1906. Spicer, Holmes, Trans. Ophth. Soc. of U. K. Aurand, Soc. Franc. d'Ophtal., 1906. De Schweinitz, Annals of Ophthal., 1906. Eischnig, Klin. Monatsbl., 1905. Uhthoff, Graefe-Saemisch, 2d edit. Baas, Arch. f. Ophth., 1894. De Schweinitz, Trans. Amer. Ophth. Soc., 1906. De Schweinitz, Jour. Amer. Med. Assoc., 1907. Bull, C. Stedman, Trans. Amer. Ophth. Soc., 1905. Grover, Munch. Med. Wochenschr., 52, p. No. 39. Peters, Klin. Monatsbl., 1901. Maier, Actiologie der Chor. Dissem. Inaug. Dissert, Tubingen, 1902.

THE DISTANT EFFECTS OF ANOMALIES OF THE UPPER AIR PASSAGES.

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About a quarter of a century has passed since the medical world was startled by the remarkable statements of Hack concerning the nasal origin of a number of extranasal disturbances. A flood of literature, mostly confirmative, followed within the next few years; although occasionally a skeptic voice was heard as well. Gradually the discussion has quieted, and the subject, though not ignored in rhinologic publications, is now less frequently mentioned than formerly, while the internist has never accepted fully the teaching regarding the nasal origin of distant affections. It was especially the uncritical exaggeration of the frequency of nasal reflexes which led to this reaction in medical creed. But surely the numerous cures of twenty years ago were not all errors and self-deception. It has, hence, seemed to me appropriate to review our present knowledge concerning the effects of nasal and pharvngeal anomalies and diseases upon other parts of the body. I am afraid I have but little to sav that most of my audience is not familiar with; but an occasional retrospect, if only wide enough in survey, is generally not unprofitable.

Let me begin with the consideration of spasmodic asthma, the most important of all derangements of alleged nasal origin. Even before Hack's day, Fraenkel and Voltolini had observed asthma to be relieved by the removal of nasal polypi. Hack popularized this observation on the basis of a very large experience, and it has since been confirmed by so many observers that skepticism regarding the relationship of nasal polypi to asthma is out of place. It must be added, however, that polypi do not always cause asthma, but only occasionally, and that in the large majority of cases asthma is not due to polypi. Thorough operation almost invariably stops the asthma permanently; while a relapse of polypi formation will again lead to the asthmatic attacks. In the light of our more recent knowledge we must attribute failure after apparently thorough operation to the persistence of some sinus suppuration, which so often is the real cause of polypi. In relatively rare instances

asthma seems to depend on sinus suppuration, uncomplicated by polypoid hypertrophy, and will cease after proper nasal surgery.

The most startling claim by Hack referred to the possibility of curing asthma in many instances by destroying galvanocaustically the enlarged cavernous tissue covering the anterior end of the inferior turbinal. In fact, he regarded the cavernous tissue as a relay, so to speak. Its turgescence, the result of pre-existing nasal inflammations or irritating anomalies, was supposed by him to be the starting point of reflex influences culminating in asthma. The fact that many cases of asthma are temporarily, and some even permanently, relieved by deep cauterization of the front end of the inferior turbinals is proof that Hack's views regarding the rôle of the cavernous plexus were founded on good observation. But he attributed too much independence to the vascular hypertrophy. It is really a secondary lesion, even if we can not explain its occurrence fully in every instance. It is generally either the consequence of a septum irregularity in somewhat neurotic patients, or indicative of hidden polypi or sinus disease. Hence, the influence of such nasal cauterization upon the asthma is more often temporary than permanent. But the complete relief of nasal stenosis by a septum resection or a partial amputation of a protruding turbinal can in proper instances cure asthma permanently. I have likewise known great relief of asthma-I am not sure of a perfect cure-to follow an adenoid operation in children.

In the discussion of the etiology of asthma we can also not ignore the statement of Francis that he has cured hundreds of cases by bilateral cauterization of the area beneath the tuberculum septi, even in subjects who presented no demonstrable nasal anomaly. This remarkable claim has never been shown to be untrue. It has been partly confirmed by McDonald and others. In a small number of observations I have myself seen good permanent results from Francis' method. It must, hence, be insisted that in certain instances asthma is started by nasal anomalies and can be arrested by their cure. At the same time, it should be emphasized that probably in most cases it is not of nasal origin. It should also be added that long-standing cases, complicated by emphysema, may have been started from the nose originally, even if they can be no longer influenced or cured by nasal therapeutics.

Before referring to the explanation of the nasal origin of asthma, allow me to detail some other instances of influence of the upper air passages upon the lower; instances, no doubt, well known to you, but not especially emphasized in literature.

As a side-issue I might mention the occasional occurrence of one-sided tonsillitis as a seguel to an operation upon the nasal septum, especially in the days before submucous surgery. It is a common observation that larvngitis is often the result of a descending infection, beginning as corvza or pharvngitis. When a larvngitis proves persistent and refractory to larvngeal treatment we find often a nasal lesion—obstructive or suppurative—the cure of which leads to the subsidence of the larvngitis. Quite similar observations may be made regarding the pathogenesis of recurrent and chronic bronchitis in young people. In some we learn that every coryza leads to a bronchitis, which, in the course of repeated attacks, becomes more and more persistent. In really chronic cases, at least up to middle age, a nasal obstructive or suppurative lesion is commonly present, and its baneful effect shown by the disappearance of the bronchial inflammation after the cure of the nasal anomaly. I have likewise observed that a recurrent bronchitis lasting during the winter season in children ceased permanently after the removal of adenoids.

It is not possible as yet to explain satisfactorily in all cases the pathological dominance of the upper air passages upon the lower. We can understand, at least partly, how an infection travels downward, but why nasal lesions should interfere with the spontaneous recovery of a laryngitis or bronchitis is not clear. Nor do we know positively how a nasal irritative lesion can bring on an asthmatic attack. The presumable and probable spasm of the musculature of the bronchioles during the attack may be a clear case of reflex started from the nose. But asthma is undoubtedly more than muscular spasm. The characteristic sputum and râles indicate an exudative lesion, presumably edema, for any actual inflammatory change would not begin and end as abruptly as the attack.

That edema does play a rôle in asthma is also made probable by examining the nasal passages during an irritation that is apt to be followed or accompanied by asthma; for instance, in hay fever patients, or in subjects sensitive to horse emanation. The swelling of the nasal mucosa in such cases is not merely due to vascular engorgement, but to actual edematous turgescence. The former can be controlled by cocain and adrenalin, but the latter—the sogginess—remains. In sensitive subjects, pollen-toxin and horse emanation may bring on edema in other areas as well as in the nose; for instance, the conjunctiva and the eyelids. But the nasal mucosa is either the most sensitive to the poison in susceptible subjects, or

at least the most exposed surface, and clinical experience teaches that when the irritation and turgescence, and, secondarily, the edema have been started in the nose these conditions are apt to extend into the bronchial tubes.

Notwithstanding our incomplete understanding of the mode of extension of morbid processes downward, the clinical experience is positive that we can often benefit or cure permanently recurrent or chronic affections of the bronchial system by restoring normal conditions in the upper air passages.

As morbid influences and processes may extend downward, so they may pass from the nose and throat into the ear. In fact, we can state as proven that with the exception of tubercular otitis all diseases of the middle ear proper are caused by morbid influences from the nasopharynx. Even in the eruptive fevers we have reason to believe that the real mischief in the ear is not done by the specific virus in the blood, but by secondary infection through the Eustachian channel, according to the postmortem findings of Bezold. In a general way we can formulate our knowledge concerning the morbid influence of the nose and pharynx upon the ear in these words:

Subacute, and even acute, though mild, infections of the nasopharynx in childhood, especially in the presence of adenoids, lead to inflammatory edema limited to the Eustachian tube and generally not extending into the middle ear. Acute infections of sufficient severity invade the middle ear and produce a catarrhal, a nonperforating simple otitis or a purulent otitis with perforation, according to the virulence of the process. This extension is favored by gross structural lesions like hypertrophy of the pharyngeal tonsil and nasal stenosis. The latter has, as a rule, a distinct one-sided influence. The same unfavorable structural anomalies which aid in the extension of infection into the ear also retard recovery in the case of catarrhal otitis. When chronic hypertrophic changes in the mucosa of the nose and pharvnx affect the ear it is in the form of chronic proliferative otitis. In this chronic process the pernicious effect of one-sided nasal stenosis again shows itself in the common predominence of ear involvement on the obstructed side.

The involvement of the eye and its appendages in consequence of nasal disease is at the present in the foreground of special research and it is unnecessary to enter here into detail. By continuity of surface, infection can spread from the nose into the lacrimal sac. In other instances, however, of graver lesion of the eye or its nerves the route is by way of pyogenic extension or diffusion of toxins through the walls of the various nasal sinuses.

The domain of alleged nasal reflexes has narrowed very much since the days of Hack. In fact, as the writer has pointed out repeatedly, the term nasal reflex is not in accordance with physiologic usage, even in actually demonstrated instances of nervous disturbances. Where nasal irritation causes a sneezing fit or lacrimation, it is indeed a case of exaggerated physiologic reflex. But when some distant pain is brought on by an intranasal condition, it is more appropriate and descriptive to speak of it as a neurosis of nasal origin, rather than call it a nasal reflex.

That various forms of neuralgia are due to sinus disease has no doubt been learned by every rhinologist through his own experience. But, unfortunately, this important fact is not sufficiently remembered by the general practitioner. But here again we must guard against exaggeration. The most important of all neuralgias—typical tic douloureux—with its intermitting shooting pains, is not ordinarily of nasal origin. A singular and not as yet explained observation is the regular periodicity as to the time of day of supraorbital neuralgia due to acute frontal or ethmoid sinuitis.

To what extent headache may be due to nasal diseases is a question still under discussion. Hack's claim of the frequent cure of migraine by cauterization of the turgescent turbinal has not been confirmed by the experience of others. But that migraine or headache of similar periodicity may sometimes depend on or be intensified by sinus disease is a matter of definite experience. Less positive is our information regarding the relationship of some instances of migraine to pressure by an enlarged middle turbinal.

Even if we include in the list of nasal headaches the suffering produced at times by acute or severe chronic sinuitis, we can not but admit that the nose, while at times a factor, is not a relatively frequent source of headache, less important, at least numerically, than the eye.

There are on record a small number, but among them some well authenticated instances of epileptic attacks which ceased permanently or at least during a long period of observation after the removal of some intranasal lesion. Such cases are a rarity, like epileptiform spasms of ocular, dental, or intestinal origin, or those due to sensitive scars, but their possible occurrence should be borne in mind. In the earlier days of "Reflexes," about half a dozen instances of exophthalmic goiter were reported cured by cauterization of the turbinals. Semon, on the other hand, saw the symptoms of Graves' disease appear transiently after an intranasal cauterization. As no further confirmation of such a relationship

has been published in more recent times, it is scarcely possible to assign the proper value to these earlier reports.

Among the real reflexes started in the nose may be mentioned irregular circulatory disturbances, attacks of flushing of the face—on the other hand, cold feet, fast or again sometimes retarded heart action. These accidents seem to occur only in neurotic subjects and they certainly border on hysteria, but nasal therapy sometimes proves that they had indeed their origin from within the nose.

Flies and a few of his followers have contended for a definite relation between sensitive areas in the nose and menstrual distress. As far as observations have been published by other critical observers, they have, in general, not at all confirmed these singular claims.

With the prone position during sleep, when engorgement of the cavernous tissue adds its obstructive effect to that of the gross lesions like adenoids, or, less commonly, hypertrophies of the posterior turbinals or septum irregularities—various disturbances may occur due in part to asphyxia. As such we may mention nightmare, glottis spasm and the not infrequent nocturnal enuresis of adenoid children.

Obstructive lesions, unless fully compensated by the width of the respiratory channels, act injuriously in a mechanical way by increasing the negative inspiratory intrathoracic pressure and conversely the positive expiratory pressure. This is probably an important factor in the maintenance of a chronic bronchitis. It has also been shown by Freudenthal to favor the occurrence of inguinal hernia. Older French observers have called attention to the coincidence of large tonsils with pigeon-breast and circular constriction of the thorax at the level of the diaphragm. These bony lesions are scarcely likely to occur except in rachitic children, and it is safe to say that they are not due to the large faucial tonsils, but to the hypertrophied pharyngeal tonsil, which was not known to the older authors. Nowadays adenoid obstruction of a high degree is so rarely allowed to remain without early operation that such secondary deformities of the chest are not often seen.

A promising field for inquiry is the question: to what extent infection can enter the general system through the tonsils and the lymphatic tissue of the pharynx. Perhaps the most positive answer can be given to this query as far as it relates to rheumatism. There are now on record a fair number of observers who agree that acute rheumatism is at times ushered in by an acute tonsillitis. There is much discrepancy as to the frequency of this association,

but against its existence no voice has been heard. The rheumatic "virus" has not yet been identified, and we have no reason to believe that it always enters through the tonsil; or even does so in most cases. But the clinical evidence is definite that at least in some proportion of instances an acute angina is the first act of the rheumatic drama. It is not so certain, but not improbable, that persistent or recurrent rheumatism may be kept up by a chronic lesion of the tonsil. At least it has been noted that persistent rheumatism sometimes disappears after tonsillotomy.

Our knowledge regarding the invasion of the body by the tubercle bacillus through the tonsillar route is less definite, at least from the clinical side. It has been learned that tubercles exist in more than 5 per cent. of all excised tonsils and adenoids. This form of tuberculosis is, however, clinically latent; it can not be recognized by inspection. It is fairly common in subjects otherwise tubercular. But in a smaller proportion it is apparently a primary tuberculosis of the lymphatic tissue. Often, but not invariably, enlarged cervical lymph glands show that invasion has passed beyond the pharyngeal portal of entrance. But we are not yet in a position to say how much of a menace to the health this latent tuberculosis of the tonsillar tissue represents.

It is a fairly frequent observation that the enlarged pharyngeal tonsil retards the growth and vigor of children, even in the absence of demonstrable tuberculosis. This is sometimes the case even when the adenoid growth is so moderate that it obstructs breathing but to a very slight extent. It is by no means rare to observe in such instances a most satisfactory development of the body after the operation and clearly due to the removal of the morbid lymphatic tissue.

Acute inflammation of the pharyngeal tissues has been followed by various phlegmonous or pyemic sequelæ in distant parts of the body according to many observations. Such accidents are, it is true, not frequent, but their occasional occurrence is reported every now and then. Pyogenic disease of the accessory sinuses, too, is responsible for a series of serious sequelæ. Metastatic involvement of distant parts by route of the blood vessels does not seem, however, to be common in connection with suppurating nasal sinuses. It is the direct pyogenic extension which is to be feared. Probably the greatest danger pertains to the optic nerves. The various intranasal lesions, which we dread as a danger of ear suppuration, especially meningitis and brain abscess, have all been observed as sequelæ of sinus suppuration, but infinitely less frequently than in connection with disease of the middle ear.

Lesions which interfere materially with nasal latency may clog the mind, so to speak, as well as the nose. We have all seen plenty of illustrations of Guye's aprosexia, the inability of adenoid children to concentrate their attention with steadiness. In almost any case of acute coryza of sufficient severity we can temporarily observe the same interference with clear and maintained thinking. Occasionally, too, adult patients with pronounced nasal stenosis mention after a satisfactory cure that they are less subject to fits of depression than they were while unable to breathe freely through the nose.

This review of diseases and derangements of other parts of the system dependent on morbid conditions of the upper air passages shows the importance of rhinology to general medicine. Most of the instances quoted have been so generally observed that their occurrence is beyond discussion and their dependence on nasal or pharvngeal lesions established by successful local therapy. other instances are either less well authenticated or at least not so common. Moreover, we must not forget that a morbid influence of nasal and pharyngeal affections on distant parts occurs only in a minority of cases and that other predisposing factors are necessary. Thus, for instance, nasal polypi do not bring on asthma in all subjects, but only in certain individuals with less stable nervous system. We see tonsillitis nearly every day, but only very few attacks are followed by rheumatism, and many a younger practitioner has never met with any of the more serious sequelæ of an angina. We are gradually learning that pathological events are in many instances not the inevitable result of a single cause, like a fracture brought on directly by a blow. In reality many morbid derangements are the outcome of a series of predisposing factors which happen to coincide at the time. An etiological study is, hence, incomplete if it limits itself to the one principle "cause" of a disease and neglects the necessary predisposing conditions. Rhinology, like all specialties, should, therefore, be but a part and not an isolated detached offshoot of general medicine. Its dignity in the esteem of the physician in general will rise if we work with him in the study of the causes of disease, while showing him in which instances the starting point of an affection lies within our domain.

ORIGINAL PAPERS.

THE MIND OF THE PATIENT. SAM C. NORRIS, M.D.

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That a large majority of our patients have minds will be granted by all. That the mind of the patient exerts some influence upon the functions of the body should also, and probably will be, admited by us all. The extent to which this influence is capable of being exerted will, I anticipate, develop a variety of opinions. This variation of opinions will depend very largely upon the following factors:

- 1. The completeness and correctness of each individual understanding of the principles involved, and his ability to put them into practice.
- 2. Whether or not he systematically takes cognizance of the mental factor in each case, and conscientiously endeavors to correct its faulty action, when present.
- 3. The susceptibility of the particular class of patients with whom he has had most experience.

I assume that the question of mental influence itself is no longer open to debate within the profession, and my plea is for a greater consideration, upon the part of the profession, of the mental factor that is in operation in some degree in practically every case seeking the physician's aid; and for a more rational and scientific effort to administer to its shortcomings.

For convenience sake we can group our cases as follows: 1. Cases of either functional or organic disease, combined with a normally acting mental factor. 2. Cases with or without either functional or organic disease, combined with an abnormally acting mental factor.

Cases in the first group are comparatively few in number, and offer but little opportunity for the skill of the psychotherapeutist, because the effect of the action of a normal mental factor is always in the right direction, and consists mainly in an active cooperation in the physician's efforts, and a confident expectation of a perfect and speedy recovery, combined with the ability to reject the vicious

suggestions of the ever present, well meaning, but injudicious and ignorant, friends, relatives, etc.

In cases of serious illness experience has taught the discerning physician to foster and encourage the action of this normal mental factor as his greatest ally, even though, as is often the case, he fails to comprehend its true significance, or the *modus operandi* thereof.

The cases of the second group constitute by far the larger number of those applying for relief. Here again it will prove convenient, as well as practical, to subdivide them as follows:

Group A.—Cases evidencing undoubted symptoms of disease, either functional or organic, combined with a more or less perverted action of the mental factor.

Group B.—Cases evidencing only a modicum of disease, either functional or organic, combined with a mental factor the faulty action of which is so exaggerated that it predominates the whole case.

Group C.—Cases yielding absolutely no evidence of either organic or functional disease, even to the most exact and exhaustive diagnostic methods known to medical science; but coupled to an absolutely abnormally acting mental factor, that conceives and elaborates complete clinical pictures, of the most diverse character. These range from comparatively insignificant simple ailments to complex complications that apparently exceed the bounds of possibility.

Of course, these groups are not divided by hard and fast lines, but shade gradually one into the other, and it will frequently impose a severe tax upon our diagnostic acumen before we are able to correctly place some of them.

Thus we see there is present in practically all cases an element (which, for want of a better name, I have called the mental factor) of the highest potential possibilities for good or evil, just as its power may be directed. Yet, my fourteen years' careful observation of the methods and practices of many physicians of all kinds, both the specialists and the general practitioners, the country doctors and the city doctors, the young doctors and the old doctors, the famous doctors, the would-be famous doctors and the others, leads me to the conclusion that only a small minority of all physicians give any systematic recognition to this all powerful mental factor, as affecting either their diagnosis or their treatment. And the larger percentage of this small minority do so, either in a haphazard manner or wholly unconsciously; having been endowed by Nature with the faculty of being powerful mental suggesters. These

latter consequently never give it any recognition or weight in arriving at their diagnosis.

In order to inaugurate rational therapeutic measures in any case, it is absolutely necessary, in my opinion, to determine with some degree of certainty, which symptoms depend upon the presence of actual pathological lesions, and which upon the perverted action of the mental factor.

I am positive that the most powerful suggestion, even under ideal conditions, can not affect the slightest change in the essential life history of a single cell participating in a pathological lesion; or for that matter in the essential life history of a single cell of the entire body. Otherwise there would be no occasion for bald heads and homely features, and no use for glass eyes, artificial teeth and cork limbs.

On the contrary, I am as positive that the essential physiological reactions of our most potent drugs are incapable, of themselves, of effecting the slightest change in either the degree or character of the reaction of the mental factor. This operation of the mental factor, both in its normal and perverted characters, is only its automatic reaction to the accepted suggestions of both extraneous and autogenous origin, with which the objective mind of man is continually bombarded throughout the whole period of his wakeful hours. In other words, the reaction of the mental factor is amenable only to suggestion. Thus we have defined for us both the possibilities and the limitations of the physical and mental factors present in each case; and I hold that it is necessary to make this distinction, and give it due weight in the diagnosis, in order to be able to intelligently administer appropriately to both conditions.

This differentiation of symptoms presents considerable difficulty to the novice in this line of work, owing mainly to lack of training in this particular. But the difficulty is no more insurmountable than were the difficulties of physical diagnosis during student days. I will venture the opinion that the first time that you essayed to make a vaginal examination, you were not real sure whether you were palpating the right ovary or the lobe of the right ear. Or the first time that you looked into an eye through an ophthalmoscope, you were not certain whether you were looking at the optic nerve or the occipital protuberance. Yet, in the light of experience these difficulties rapidly fade away, and when we pay particular attention to it, it is surprising how readily we acquire both the ability and the knack of differentiating the true pathological from the mental symptoms.

However, it must always be borne in mind that so far as the patient is concerned the one set of symptoms is just as important, just as real, and causes as much pain, anguish and anxiety as the other. And it is the duty of the physician to administer appropriately to the one as to the other.

It is my candid opinion that in this particular the profession as a whole, including therein our medical schools and colleges, has been exceedingly derelict in its duty.

Instead of the mere admission of its existence, and the customary perfunctory reference to its possible influence, had the mental factor in disease always received due consideration, efficient study and adequate teaching, the rank and file of the profession would long ago have been equipped to extend scientifically and efficiently to these mental sufferers the relief they sought; and there would be no occasion or necessity for unqualified "sects, sciences and church movements" usurping the prerogatives, duties, honors and emoluments that theoretically, logically, legitimately and practically belong to the medical profession.

The profession has itself alone to blame for the condition of things as they exist to-day, and which, to say the least, are not conducive to the best interests of either the profession or the laity; nor do I perceive that very much is being done in the way of rectification. Hence, the plea of my paper.

I shall now presume to occupy a few minutes time to rehearse, for a particular purpose, one or two points in the history of this subject. First let us note the fact that its ramifications in some form or other extend far into antiquity—some hundreds of years before the time of Christ, and form a contemporaneous part of both the general and medical history of the world.

It appears that from the beginning, first in this place and then in that, and in divers and sundry ways, some persons became in a slight measure familiar with the practical operation of the mind's influence over the functions of the body; and while wholly in blissful ignorance of the principles involved, nevertheless proceeded to build a reputation, acquire fame and sometimes amass fortune, by evolving a system, pathy, ism or science of treating diseases by their newly discovered method—each according to the degree of his enlightenment.

History, general, medical and theological, teems with instances of the rise to more or less enduring fame of these saints, sinners, savants and charlatans. The great degree of ignorance, or rather the very limited available knowledge, permitted only a varying season of prosperity, after which there came in the majority of cases the fall, disgrace, misery, prison, oblivion—each according to his due.

These operators, experimenters, or whatever you wish to call them, included persons from all stations of life, princes, priests and paupers—from crowned heads to convicts, of all degrees of intelligence, grades of education and forms of religious belief.

I repeat, that few if any of them had any conception at all of the source of the power, its capabilities, its limitations or of the scientific principles involved; in fact, they did not understand it at all; hence, their only recourse was to take refuge beneath the cloak which ignorance has worn since the beginning of the world the miraculous and the supernatural.

The particular degree of ignorance of each individual operator, supplemented in many cases by an amount of world wise cunning, led to the adoption of much that was mysterious, secretive and often surrounded by elaborate fantastical clap-trap. To such an individual his particular method was imperatively necessary: first, because he had learned or developed that way, and being ignorant of the involved principles, he was compelled to proceed according to rule of thumb, and in not a few instances the operator himself was firm in the belief that it was a supernatural power; second, it served to duly impress the patient, and to gain his confidence to a high degree, which is one of the recognized prerequisites for success in this line of work; third, it furnished the means of a plausible explanation for something not readily explainable otherwise.

Allowing for a multitude of variations of secondary or minor importance, and whole realms of irrelevant matter, this is a very condensed outline of this subject from the beginning almost down to the present day. To say that the various means employed never accomplished their purpose would be as untrue and as absurd as to maintain that they were always successful. They accomplished their successes and suffered their failures just as we all do to-day.

During the latter part of the eighteenth and first part of the nineteenth centuries a great impetus was given this field of investigation, first by the work and career of Mesmer, the magnetizer, followed by that of Braid, Liebeault, Bernheim and Charcot in the domain of hypnotism. These chapters certainly read with interest akin to a first perusal of the Arabian Knights or the Adventures of Sherlock Holmes.

Do not entertain the idea that only quacks and charlatans were engaged in these pursuits; on the contrary, investigations were

carried on by many of the best qualified medical and scientific minds of the day. And there is much evidence to show that in the endeavor to arrive at the truth of the question at issue, much acrimonious argument was used with an earnestness that has left an undesirable impress upon the subject that has endured to the present day.

In the light of our present knowledge, we know that these allied conditions of mesmerism and hypnotism represent only one phase of the subject, or are themselves simply phenomena of suggestion, and as such are neither necessary nor desirable in the treatment of disease. This is so because the corrective suggestion administered during the hypnotic state, partakes almost entirely of the nature of a negative hallucination, which is used to displace or take precedence of a former positive one; when the rational procedure to be aimed at is the removal of all hallucinations from the mind of the patient.

If you will allow me to digress a moment here, let me direct your attention to the fact that of all the treacherous rocks that are liable to cause trouble, if not complete wreck for the psychic navigator, the very worst is this thing called "the negative hallucination."

The natural current of our thoughts and our commonest modes of expression both tend to bump us continually against its sharpest crags, and only "eternal vigilance" will guard us against introducing this negative hallucination when and where we least desire it, even in ordinary psychic treatment. There is not the slightest doubt but that it many times contributes wonderfully to the mental welfare and comfort of the patient, and it is efficacious so long as the hallucination remains securely anchored in what the psychologists are pleased to denominate the "ideational field." Here it is continually exposed, as it were, to the wash of the whole current of ideas of the patient, any one of which may by its suggestive influence loosen its anchorage, and just in proportion as it drifts from its moorings with the current, so its efficacy dwindles. It is directly analogous to the anodyne effect of a dose of morphin; it is efficacious so long as the effect lasts, but in the very nature of things it must almost necessarily prove to be evanescent.

In the hands of an adept, and like its analogue morphin, its use is at times justifiable to accomplish a certain end, but its habitual use as a curative agent, even in its particular field, is as illogical and culpable as would be the attempt to cure an attack of acute suppurative mastoiditis by repeated morphin injections.

Only a short time ago I witnessed the estimable wife of a fellow-

townsman sink quietly unto death under the strongly driven home and hourly reinforced negative hallucination that there was absolutely nothing the matter with her, and that she was well; when in fact she slowly died from acute toxemic exhaustion consequent upon an enormously dilated stomach and its sequelæ, in which a great variety of food had been for a long time administered ad libitum. I feel very confident that appropriate means at the proper time would have averted this catastrophe.

Now, to return to our main issue. As early as 1814, Abbe de Faria, a physician, while engaged in the study of mesmerism, declared "that the observed phenomena had their origin in the mind of the patient, and that the causes were to be sought for in the subject himself." Faria sought to disseminate this teaching freely to the profession, but they refused to accept or profit by it. He was years ahead of his time.

Later, Bernheim announced that he could produce, by oral suggestion alone, each and every phenomenon capable of being produced by the aid of the various mechanical apparatus so generally in vogue at this time. These decisions cleave close to the root of the whole matter, but it is doubtful if Bernheim himself fully appreciated the extent of the advance that he had learned, because his mind was wholly occupied with studying the phenomena of hypnotism, which we now know is only a sharply limited single phase of psychism, that is of very, very limited, if any, practical use in the field of psychotherapeutics.

In our endeavor to acquire efficient knowledge of this subject we will, of course, have recourse to books, and the literature of two avenues of learning present for our consideration. On scientific grounds we may essay to approach the subject by the physiological route, and we learn much about the structure of brain and cord, and of function of neurones, dendrites, collaterals, etc. But pursued to its legitimate end, yes we might, by metaphysical theorizing under the hybrid title of physiological-psychology, stretch it very much beyond its legitimate end, and still there remains a great gap between the knowledge we desire and that which we are able to obtain.

We then turn to psychology itself with great expectations; and we study, and we study, and then we read and read, and then read some more in an earnest endeavor to reach a definite legitimate end. I have never been able to find it, and I honestly believe that the legitimate end of psychology may possibly be found in the asylum or the grave, but certainly not in the books of to-day.

However, if we are unable to work this thing out to our entire satisfaction with the exactness of science, yet we learn much from psychology that is of the greatest practical value.

For our purpose let us note particularly that the mind of man is of a dual or double nature, and while each part functionates separately, they are nevertheless mutually associated, their fields of operation often overlapping, and within rather wide limits they are mutually subject to the control and action of each other. Upon these points all informed psychologists are practically agreed.

These two parts of the mind are variously named according to the author's ideas and the dictates of fancy. The one with which we are at present most concerned is variously called the subjective mind, the subconscious mind, the unconscious mind, the animal mind, the reflex mind, etc., etc. Opposed to these, the other part of the mind is just as variously called the objective mind, the conscious mind, the intelligent mind, the body mind, etc., etc. I will confine myself to the use of subjective and objective mind, not that they are any better than the others, but habitual use has rendered them more familiar.

The subjective mind is that part of man's psychic apparatus that presides over, governs and regulates the functions of the different organs of the body. Hence the very great frequency of derangement of function as the result of its perverted action. However, this does not preclude the possibility of essential functional derangement due to other causes than the perverted action of the mental factor. It also appears to be the power governing and controlling all bodily actions when they approach to or become what we term automatic, consequently its power is predominant in the field of the reflexes, which are only the set automatic reactions of particular stimuli. It appears to be practically perfect in both action and development at the time of birth, to be always in operation, to be capable of deductive reasoning only, and in all the ordinary affairs of life it is submissive and subservient, within very wide limits, to the dictates and mandates of the other part—the objective mind.

It is the throne of intuition, and upon occasions when the integrity or vital welfare of the body is suddenly threatened, there is good evidence to show that it is capable of acting independently, but automatically to the end of preserving life.

Now, please note carefully the following: It is the part of man's psychic apparatus that is amenable to suggestion, and except under the most abnormal conditions (the hypnotic state, life threatening accidents, etc.), the only port of entrance to the subjective mind

is through the objective mind by way of the senses. (Hence our inability to treat psychically or suggestively infants, idiots, the unconscious and the antagonistic.) The suggestion offered to the objective mind of the patient must pass the scrutiny and criticism of his fixed beliefs, his judgment, reason and experience, before it is transmitted as a mandate to the domain of the subjective mind, where it becomes the stimulus that elicits the automatic response. This response, which very closely resembles, if it is not identical with every other automatic reflex of the body, takes place, when the requisite conditions are present, be it in Christian, pagan or infidel; white, black, red or vellow, in the light of the most perfect knowledge, or the darkness of the densest ignorance of the modus operandi thereof, it takes place, I sav, with a regularity, constancy and uniformity, that cause it to assume the dignity of a natural law. If our suggestion, be it by word, sign, look, manner, advice, drug, placebo or what not, corresponds with his general fixed beliefs, appeals to his judgment and reason, and is in accord with his experience, our pathway is easy and our success assured. Contrary conditions, and our pathway becomes rough and thorny; and unless we are in some manner able to gain his confidence, and overcome his antagonism to the extent of being able to slip, shoot, drive or pound our suggestions home to his subjective mind, we are doomed to failure, because our suggestions can never become effective unless they reach the subjective mind, and there complete the reflex nervous arc. Everything, therefore, depends upon the conditions existing between patient and physician, and the better the physician understands these requisite conditions, the better he is able to pave the way for success by creating them in the patient.

The prime requisite is the confidence of the patient in the integrity of the physician and his methods. Implicit confidence and an expert psycho-therapist will, in a suitable case, invariably exemplify the biblical dictum "Thy faith hath made thee whole." And, "lest we forget," under similar conditions, should any physician prove unworthy of such implicit confidence, or be detected in an attempt to prey upon the credulity of the patient, his retribution will be sure and sharp, and so far as that patient is concerned "his perfidy hath damned him forever."

Speaking figuratively, we may in a measure liken this subject to a particular stone, which legend tells us was neither oblong nor square, but of a peculiar shape and beautiful design, but for which no place could be found, so it was thrown among the rubbish of the building as unfit for use. There it remained until the completion of the building, and when found among the rubbish, it proved to be the keystone that completed the main arch. I am sure many of you are familiar with this legend.

Now, when and by whom our stone of mental influence was first blasted from Nature's secret quarry we are unable to glean from the musty pages of ancient history. However, the dressing, facing and shaping, occupying centuries of time, has been very largely, if not entirely, executed by persons identified with or closely allied to the medical fraternity. Later history informs us in a manner that leaves no room for doubt, that the fundamental carving and greatest embellishments are directly and entirely the work of physicians, as heretofore mentioned.

While always having knowledge of its existence, and admiring its beauty, shape and proportions, even from time to time indulging in the most acrimonious arguments as to its further embellishment, the profession has ever been loth to recognize its true value, accept it as a working tool, or grant it its rightful position as a component voussoir in the arch of medical knowledge, but have repeatedly cast it aside among the rubbish as unfit for use.

"'Tis true 'tis pity;
And pity 'tis 'tis true."

Attracted by its peculiar shape, and admiring its beautiful proportions and wealth of embellishment, some persons have resurrected it from the rubbish about the base of the arch, and transporting it a long distance from its natural habitat, have endeavored to put it to practical use by setting it up as the "cornerstone" of a new edifice in the world of therapeutics.

Being unlettered in the fundamental learning necessary to a correct interpretation of the use for which it was designed, they have overlooked the fact that it is neither oblong nor square, but of peculiar shape, and as a "cornerstone" is illy fitted to serve as a foundation. Consequently the edifice they have reared is out of plumb with Nature's laws, and being neither oblong nor square, is so out of proportion as to render the whole structure wapper-jawed—in more ways than one.

While thus severely criticising others for its misuse, we must not be unmindful of the fact that our profession, in the light of its knowledge and opportunities, is subject to even severer criticism by reason of its customary perfunctory use.

I say, hasten the day when a sufficient number of the profession shall awaken to the importance, the necessity, the value and the advisability of reclaiming, by might of right, the misused stone, and shall have the courage to proceed forthwith to cement it securely and permanently where it of right belongs, not in the rubbish pile, but as one of the component stones in the great arch of medical knowledge; and with it will return the time honored prominence, prestige and patronage, which are the just and right dues of the profession.

In conclusion, just a note of caution, lest the pendulum may, in some cases, swing too far. The peculiar shape of this stone, that of a voussoir or wedge-shaped stone, proves that it is only a component part of the body of the arch. It is not a keystone, for when that is cemented into place the work is completed, and I do not think that any of us are of the opinion that the great arch of medical knowledge is completed, or is likely to be completed for several years to come.

DISCUSSION.

Dr. McAllister:—Have you in mind any practical book on this subject that you can recommend?

Dr. Stucky, Lexington, Ky:-I do not think an important and interesting paper like this should pass without some discussion. Unfortunately, the theme is so big and has been so long wrapped up with transcendentalism and mesmerism and such things that we do not know much about it and we are afraid of it; but the time has come when the medical profession must enter this domain and show to the people just what is meant by psycho-therapeutics or psychology. You know the effect of the mind over the body to a certain extent; so do I. You know like begets like, and if you lack confidence in what you say or do for your patient you beget the same lack of confidence in the patient. I suppose all of you have seen a psychic hemorrhage. The bleeding is the result of fear. I removed a middle turbinate, and the patient bled very freely after I left, but the moment I returned and stayed in the room she would not bleed. It was purely a case of fear. Those of you who have tried to do a mastoid operation under local anesthesia know the power and absolute necessity of talk-of suggestion on the part of the operator while operating. As long as you keep up confidence or guide the mental attitude of your patient you can operate, but you must get the cooperation of the patient. Build them up. It is a dangerous thing, as the author says. You can psychologize your patient, and every successful physician is successful in this. How many of us make a diagnosis that we can not account for? an intuitive diagnosis; a diagnosis by exclusion, and after that there is still something that tells you something else. It is intuitive diagnosis. Whether it is subjective or objective I do not know. I am glad that the doctor has brought this topic before us and given us something to think about. I wish we had a better working basis. There should be in every medical university and college a chair of Psychological Medicine, where this and kindred subjects are thoroughly taught.

DR. DAVIS:—I am greatly appreciative of this excellent paper and the general suggestions. It strikes me particularly in laryngological work, in which I know of no factor of greater importance than that of suggestion, of psychical or mental impression on the patient, particularly in operative work. In the removal of benign growths of the larynx we use local anesthesia in preference to a general anesthetic, and, notwithstanding the fact that the patient may experience no pain, yet for the proper manipulation of the larynx, maintaining the correct position, and keeping the patient

quiet and free from nervous excitation, the physician's suggestions to the patient have been a larger factor than any other one that might be mentioned. I have had patients who, without the usual training of the larynx, have been perfectly quiet, whereas others, after long training, who were not under the physician's control by suggestion, were nervous and difficult to operate upon.

Dr. F. Park Lewis:-There is a definite application to Dr. Norris' paper and that is the extent to which the psychic element enters into ophthalmic practice. I have had within the year a case in my practice illustrating this phase of it. Many of us have seen cases of those persistent asthenopias in which refraction fails to afford relief, and the best efforts one can employ result in no benefit. A young man, a graduate of Johns Hopkins and a physician, a careful and trained man, after using the microscope continuously in his pathological studies, found at the end of college work that his eyes had given out and he could not read for more than five minutes at a time. He was under my care for more than a year and carefully refracted, but at the end of the year had gained nothing. I went to Europe then and in my abscence he saw some one else, but he was still no better. Some months after my return he came to tell me he was entirely well. He had been reading Du Bois's book on Psychic Therapy, which is a scientific exposition of this method of treatment. Following the methods advised by Du Bois this young man practiced autosuggestion, assuring himself each night that his eyes would be stronger in the morning, and he found that they actually were. He had no pathological condition that would prevent them being well, and at the end of three weeks he was able to say his eyes were as well as ever in his life. It was to me an interesting and illuminating case, and it is worth while to report that such cases do occur. It may be of importance in helping us to realize that with the associated help of our patients our obstinate refraction cases may improve when they would not do so from our treatment unaided.

DR. LEARTUS CONNOR:—The topic is suggestive of many points, and in none more so than the reflection that, for ages, laymen have been treating sick people and getting them well when physicians failed. This demonstrates the existence of neglected spots in medicine. Instead of reviling things that help a patient (by whatever name known) I have sought to ascertain how I could use them to relieve human suffering, and why the profession passed them by. Some, like Dr. Norris, have studied mental therapeutics individually, and have accomplished much, but as a profession we have overlooked an important factor in the causation and relief of disease. The thing to do is to find out the whys and wherefores of mental therapeutics. Can there be an intelligent study of this neglected spot in medicine that will enable students to make practical use of it? Many of us fail from our inability to use the power of the mind over morbid states.

Dr. Louchery:—With reference to using cocain injections for local anesthesia, Dr. Bodine has used 2½ per cent., and sometimes nothing but water. He invariably talked to the patients and kept the mind engaged all the time. I have seen him do his extensive operations, and they never said it hurt. There is another point not quite gone to the bottom of; a difficulty in the profession is that we are not thoroughly educated in our college work in mental philosophy and psychology, and we are unprepared and unequal to the duties and responsibilities that we have assumed, and the suggestion is that there is a new field for specialists and it is right before you now, and some of these younger men must build up in this line. The colleges must begin to teach special work. Dr. Lewis'

patient was cured by auto-suggestion. I can only treat and cure the patients that have confidence in me. Those who do not have confidence, some one has persuaded to come to me not believing I can scarcely successfully cure; some of them I can manage, but rarely. What are we to do with these cases? We must build up other specialties in the profession. As broad as medical research is, it does not cover the field. We must have this work done. The work that is to be done in the future will have to be done on different lines. When I went to school the teaching was medicine and surgery and therapeutics. But there is more to it, and we must follow this up, for the medical and surgical fields are broadening greatly.

Dr. Gibson:--I am glad to hear this subject discussed as handled here to-day. For twenty-eight years I have been reading everything I could get hold of on this subject, and as the reader of the paper has said, we have not got down to the core of it yet, but I believed when Alexander Pope wrote his Essay on Man he hit close to the core when he said "know then thyself." Get it down to that. If a physician is equipped with a full knowledge of his case and knows the things he can do, without any doubt about it, and never uses the words "guess" or "think," but, rather, "I can" and "I will," he will accomplish much more. You have, many of you, trained a horse; did you ever find that if you were afraid of him he was a very bad horse, and if you are not afraid of him he is very easily managed? Did you ever see a so-called savage dog back off and run away when he found you were not afraid of him. This is a result of the unconscious influence which we possess, and applied in therapeutics becomes the unconscious therapeutics written of, and is influenced greatly by the personality of the physician. The successful physician must give considerable attention to this conversation (which to a great extent makes his personality), not only in the presence of his patient but in the hearing of every member of the family, for the best results are secured when every member of the family is hopeful and the entire conversation of the household is assuring.

DR. PERCY FRIDENBERG:-While I do not wish to be considered as sounding a discordant note in this chorus of praise from the gentlemen who have called your attention to the control of matter by mind, permit me to call your attention to the fact that for thousands of years the study of medicine was a branch of philosophy, a branch of psychic science, and that the methods which are brought forward now in this way were the only methods known for curing the sick; and then I will ask you to compare the advance in practice and science in medicine in the fast hundred years or so, under the simple, matter-of-fact, every-day methods of natural science, in which the theory and practice of our profession are based on very definite, ascertainable facts, and not on suggestion. All the instances that have been brought forward, the influence of the physician's personality, the surroundings, etc., all these can be summed up under "common sense." They are no more a part of medicine than of law or commerce. The architect who builds your house has to have your confidence, but he has to know how to build the house, and your lawver must know the law, and the physician must know his business and have his technique at the end of his fingers. And if he knows his business he will accomplish his results if the patient has confidence in him, and if he is not thus equipped he will not accomplish results, no matter if the patient swears by him.

Dr. Robinson:—There is a difficulty that confronts us when we face this question. The quack is successful because he is so definite and positive in what he claims. A physician must preserve his moral integrity and he must decide where to draw the line. Do not go home from here and seek by postive statements alone to benefit your patient unless your statements are

founded upon absolute belief.

Dr. Norris (closing discussion):—I thank the gentlemen for their criticisms. All I have to say is that the paper seems to have developed a variety of opinions, but the plea I wished to make is that there is a scientific side to this question that is not appreciated by the majority of physicians. Every physician says, "I practice psychotherapeutics," but how? You talk with him on the subject and he betrays his ignorance of the fundamental principles involved therein. The confident assertion is all right, but to practice psychotherapy scientifically requires something more than the Svengali look and over-confident assertion.

OCULIST AND AURIST, OR OCULIST AND PHYSICIAN—WHICH?

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The gist of this short communication is illustrated by a remark made some years ago by a young man just beginning the study of medicine. He said he had always liked the idea of specializing. He had decided to take the head as his specialty. I agreed with him that it was wise to limit our field of study, and, showing him the big volume of Helmholtz's "Physiological Optics," with its ponderous mathematical formulæ, I suggested that it might be well to begin with the study of the normal condition of a small part of one of the different organs in the head. In other words, the question which I venture to ask is, which is the more natural and satisfactory object for our work? Is it better to be a well-equipped ophthalmic surgeon and a physician, or aural surgeon and physician with all that that means, or is it better to practice some ophthalmology and some otology and laryngology, and perhaps something of one or two other branches?

This suggestion that our tendency should be to limit rather than extend our field of study may not seem to accord with the purposes of a society whose avowed object is the study of ophthalmology and oto-laryngology. But when the secretary invited me to read a paper, and also left free scope as to the subject, it seemed that a few words relative to basic principles in our daily work, even though of a homiletic character, might be admissible.

There is one proposition upon which we can all agree, that a better knowledge of a subject can be obtained by studying it alone than by dividing that effort between two or more subjects. It is true many a man practices ophthalmology, otology and laryngology with apparent advantage to his patients and credit to himself. But the question before us is rather, could not that same man accomplish these two objects still better by confining himself to one branch? On this point there may be differences of opinion, so let us ask ourselves first whether either of these subjects can be really mastered in a lifetime. To determine this it will suffice to turn our attention to one department of ophthalmology, for example, and see how large a field it is, how important, and how many questions

of practical importance arise every day concerning it. Let us consider, for example, the ocular muscles.

Not every one appreciates what an enormous mass of literature has grown up about this subject. One card catalog contains over 2,600 articles relating to it, and the list is far from complete, the part relating to the pathology going back for the most part only about ten years. It is true that many of these articles are repetitions of statements and others are of no earthly use in practice. But when this entire bibliography was recently brought down to 2,000 articles for the purpose of publication, it became a serious question which should be rejected.

The question is, can any one man learn all about even this one department of ophthalmology?

But that is only a part of what we should know about the muscles alone. For we have discovered that the ocular muscles are so related to the stomach and to other organs, and are so affected by varying conditions of nutrition that pathological conditions in other portions of the body must also very frequently be taken into account.

For example, when a patient comes complaining of that indefinite group of symptoms usually called asthenopic headaches, it is impossible to say whether these symptoms are due to some anomalies or lesions in the eyes or in the stomach or in neither of these localities. If on examination we find a decided ametropia or muscle imbalance, we conclude that the difficulty is with the eyes, and prescribe corresponding glasses or suitable treatment. If they do not prove sufficient, those glasses are ordinarily changed once, twice, or several times.

But we all find cases in which even the most accurate correction of the ametropia and of every discoverable symptom of imbalance still proves insufficient. Then the ophthalmologist must ask himself from what other source these headaches and the allied symptoms may come, and his attention is often turned first to the condition of the stomach. Usually he asks some one skilled in gastric examination to ascertain what that condition is, and in due time a report is returned giving the amount of free hydrochloric acid, combined chlorids, presence of rennin, pepsin, etc., etc. But that report means very little to the ophthalmologist unless he has a really good knowledge of the normal process of digestion. Such a knowledge as he gained when a student, perhaps many years before, is quite insufficient to-day. In order to know the significance of the results obtained by modern methods he must be familiar

with the main facts, at least, gained by modern investigations in the physiology and pathology of digestion. It is true that the examiner usually accompanies his report with an opinion as to its practical bearing, but as long as the ophthalmologist must rest his own conclusions on the opinion of the gastrologist only a one-sided view of the case is taken. It is here assumed that there is always at hand a gastrologist who can, and also who will, make such examinations, and also that the patient can always pay for them.

In reality we know that-physicians who are competent to make these examinations of the stomach contents are not always at hand, and patients can not always afford the extra fee. Under such circumstances the ophthalmologist or his assistant must examine the stomach contents, as he can do, even if roughly. Fortunately, it is not at all difficult to remove the stomach contents, and the titrations and tests necessary to obtain a general idea of the condition of the digestion in a given individual can be done as easily and in much less time than is often devoted to some optical measurements. In other words, we must conclude that in certain cases in which we deal with asthenopic headaches, when the usual treatment, optical and otherwise, does not give satisfactory relief, the ophthalmologist must be fairly well acquainted with modern views of normal digestion. He must at least know what the usual findings mean, or even make those tests himself if no one can do it better for him.

All that has been said thus far concerning the condition of the stomach in one patient may apply to the condition of the kidneys in another, or to the condition of the blood in a third. In other words, in considering asthenopic headaches alone we seem forced to the conclusion that this single class of cases requires the ophthalmologist to be a physician really conversant with modern medicine.

Thus far we have been considering only the ocular muscles. But if we turn to other departments of ophthalmology, many of them will be found at once to be quite as extensive and important as the muscles. Thus the bibliography of diseases of the conjunctiva is probably as large as that of the ocular muscles. We all realize the importance of these inflammations and that many of them are dependent upon disturbances of the general system.

The same may be said of diseases of the cornea. The extent of that field is well illustrated by the fact that our honored colleague, Professor Saemisch, has given a large part of his very useful life to the study of changes in that one membrane.

The importance of changes in the lens is equally great; also that family of diseases which we group together under the general name of glaucoma, and so on with other groups of diseases of the different portions of the eye. Indeed, when we consider almost any one division of ophthalmology we appreciate how impossible it is for a person to master it in a lifetime. Let any one who would challenge this glance even superficially at the portion of Graefe-Saemisch which is now being published. Let him look through the bibliography of any one of its departments, and the idea of knowing thoroughly all ophthalmology becomes absurd—to say nothing of the relation of ophthalmology to other portions of the human organism. Therefore, if we return to our question asking whether it is better to be an oculist and a physician or an oculist and aurist, there can be but one reply. Whether we consider the advantage to the patient or the satisfaction to the practitioner, we find that

"One science only will one genius fit, So vast is art, so narrow human wit."

In view of this conclusion, I naturally ask myself why it was that when beginning professional work I practiced ophthalmology, otology, rhinology and laryngology, just as many others do still. It was simply another case of my young friend whose specialty was to be the head. Probably the reason was that I knew little and my patients, if possible, knew less. It is true that after graduating in medicine I had studied those subjects under the most eminent teachers in this country and elsewhere, not for a few months, but for a few years. With the confidence, however, born of youth and inexperience, I had not learned how ignorant I was of ophthalmology alone, or of otology alone—certainly of otology with the other two nearly allied branches. In Europe, one seldom or never practices ophthalmology with otology. In our larger eastern cities also a considerable number of our most eminent students limit their practice to one branch or the other. The custom of dealing with both classes of disease is apparently more frequent in our western and southern states than anywhere else. Indeed ophthalmology seems to have less to do with otology than with several other branches. If we think for a moment of the results of syphilis and of gonorrhea, a practitioner might better be oculist and genitourinary surgeon than oculist and aurist.

If this be true the question arises finally as to the use of a society like ours. There are several reasons for its existence.

First, it broadens the mental horizon of the real specialist. As each of us profits by a wider knowledge of modern medicine, as we

attend our state and local societies to listen to papers on the physiology and pathology of the stomach or other organs, or concerning other morbid processes, so are we interested to know more of the pathology of parts of the body near to those with which we have to do every day. But because a student wishes to learn about a territory which lies adjacent to his field, it does not follow that he must also work at all in that adjacent territory.

Second, rivalry in professional work is always a source of interest. The enthusiasm of the student is contagious. Each investigation, each piece of work well done, incites the next man to do better.

Third, the gregarious instinct is a strong bond of union in a society of this kind. Members who have known each other for several years return for the good fellowship which belongs to those whose lines of daily thought are in the same direction. These bonds strengthen as the years increase. It is probable that as the fields of ophthalmology and of otology with its allied branches grow larger, and as the list of our members becomes longer, this society may separate into two or more portions. That is not probable, however, in the immediate future.

But our final conclusion still remains, that it is not well to be an oculist and also an aurist. To become either an ophthalmic surgeon and physician or an aural surgeon and physician thoroughly equipped, means better service to the patient and more credit to the practitioner.

DISCUSSION.

DR. JACKSON: - There are two points of view from which the question may be approached, and one is that we enter the medical profession as a means of making a livelihood. From that point of view we must take a sufficiently broad portion of the work to be able to draw a clientele, to establish a practice that will give us sufficient work and sufficient return for it. Where one can draw from a large enough community and can wait long enough, probably the financial return is better if he make his line of work narrow. However, those drawing from small communities can not wait until they can draw enough patients from a narrow line of diseases, and must take a broader field. I think there should never be any attempt on the part of society or the profession generally to limit the wholesome activities of any individual. Each individual must decide for himself how broad he will make his field of work, and probably no one's practice will be exactly duplicated by any one else's. In Dr. Howe's paper we find illustration of that. He would make the stomach examinations for his eye patients. I doubt if any one else in the Academy would want to undertake that line of work. Dr. Alt, I suppose, makes all his bacteriologic examinations. Mostly I prefer to have these made by some one else. I might go on through the whole line of our work. There is no point at which one department of medicine can be absolutely separated from the others, and if one wants to work in any particular direction he ought to do it. The best work will be done where one is most interested.

On the other hand, there is much truth in urging the subject from the opposite side, in what he says about the enormous amount to be learned about the very narrowest line of work, and the impossibility of our learning all about more than a very narrow department of the general profession of medicine. No one can realize that so well as those conducting medical journals, or one who is making catalogues or reviewing the literature of a subject. Until you do that you can not realize how many thousands and thousands of pages are coming out every year that have something in them that is of value in itself or will suggest to this mind or to that mind something of very great value.

DR. CONNOR:—The topic introduced by Dr. Howe is certainly interesting. I fancy if we pass his office we will see simply "Dr. Howe" on his sign. Certainly I have never seen "oculist" or "aurist" attached to any article I have read from his hand, so that, like the most of us, he is simply a "physician." In this he follows the Eastern custom. In other localities are different fashions, and all sorts of things are attached to a doctor's name; I call them tails. Anything beyond simple "doctor" is a tail. It may be "homeopath" or "eye and ear surgeon," but I think the most dignified way is to simply use the term "physician." I do not suppose any one of us is equally competent, or at home, or equally desirous of investigating every part of ophthalmology. Dr. Savage told me the other day he had given up all ocular practice excepting refraction and muscular imbalance. What would you call him? What kind of a tail would that require? Some men do nothing but cut muscles and tie them together again-sort of a millinery ribbon work. We get on together because we work side by side, doing some things a little better than our neighbors. I think nothing is gained commercially, professionally or in any other way by the fellow that is straight with his fellows in adding more than the term "doctor" to his

Dr. Sohier Bryant:—I wish to emphasize and corroborate what was said about the difficulty of mastering any one of the small points of otology. I went into the study of otology because I thought it was small and easy and that I might make a mark in it. The more I go into it the more I find to do and the greater the impossibility of mastering even a small part of it.

Dr. Gibson:-We must get down to our professional work in a businesslike way. The manufacturer nowadays has the man who secures the raw material, one who looks after the clerical end, one for transportation, the general manager, etc. The merchant has many departments in his store and has managers for different departments. The same with the publishing business; we find the staff divided up, with a manager over the whole staff. Then why not, as physicians, go into our professional work as a business? We should have our pathologist to assist us in diagnosis to the best of his ability, the oculist to examine the eyes and the aurist to examine the ears. We need a rhinologist, a laryngologist, and a neurologist, and the business head of the institution, with his accountant. It is important to keep good records of what you do in order to have a systematized business. The time is coming, and not far away, when we will have to systematize our business and conduct our professional work on business principles. We are too busy to do anything right. The detail work requires too much valuable time for one man to do it correctly and profitably. I believe there is as much to be gained by combinations in our professional work as in any line of business. Cases would be discussed and treated-more intelligently. The office will soon be known by its results. The larger patronage will insure larger returns and the public will save many fees and gain much by better service.

DR. ALBERT H. ANDREWS:-This is another form of the question, How far and to what extent shall we specialize? Each general practitioner is supposed to cover the whole field as best he can, but conditions arise in which he can not do everything. This is the excuse for the specialist. Men differ in their capacity. Men differ in their way of thinking and doing things. There are general practitioners not as successful as they would be had they become specialists. There are specialists who are not as successful as they would have been had they remained general practitioners. There are men who can successfully devote their lives to a single phase of a subject and men who make an absolute failure if they should undertake such a course. It seems to me this is a matter each and every man should decide for himself. Of course, in any line the smaller the field the more thorough can be the work done.

DR. Howe (closing): -As for the oculist and aurist encroaching on the field of the general practitioner, I do not mean to say that each of us should make such examinations when there is any one else willing to do that. My idea was only that occasionally the oculist may have to do that himself, and he always should know how. In this country we can do better work if we keep ourselves to smaller fields, as they do also in other coun-

tries.

THE SPHENOIDAL SINUS AS A POSSIBLE ETIOLOGICAL FACTOR IN THE PRODUCTION OF RETROBULBAR NEURITIS FROM AN ANATOMICAL STAND-POINT—OBSERVATIONS ON SIXTY SPECIMENS.

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Rhinology is even yet a comparatively new science. and complete symptomatology have of necessity been compelled to await the discovery and development of improved examination methods. Consequently, it has been only during the last score of years that systematic study and observation have been made of the relationship existing between diseases of the eve and affections of the nose and its appendages.

Among the first to call attention to this intimate connection were Zuckerkandl, with his anatomical investigations, while Berger-Tyrman² took the problem up from its clinical aspect. Tiem also published many articles from 1885 to 1893. Grünwald³ in 1893 was probably the first to speak of the frequency of latent empyemata of the sinus and their bearing upon ocular disease. During later years Onodi has contributed a wealth of valuable information and data in regard to the accessory nasal sinuses and their relation to neighboring structures. In addition to the above authors many Americans as well as other Europeans have contributed voluminously and interestingly.

A glance at the long list of case reports and other contributions bearing upon this subject which have appeared in the medical literature during the past half-dozen years offers prima facie evidence of the importance ophthalmologists are paying to the rôle which disease of the accessory sinuses plays in the production of

Zuckerkandl. Normale und pathologische Anatomie der Nasenhöhle und ihrer pneumatusche Anhänge. 1893.
 Berger-Tyrman. Die Krankheiten der Keilbein-Höhle und des Siebbein Labyrinthes und Beziehungen zur Erkrankungen des Schorganes, 1886.
 Grunwald, Ludwig. Die Lehre von der Naseneiterungen mit besonderer Büchsecht und de Erkrankungen des Lieb und Keilbein.

optic nerve inflammations. It is as if a new impulse had been given to this particular factor.

In view of this, you may well be surprised to hear that a well-known American text-book appearing as late as 1904, makes no mention of sinuitis in considering the possible etiology of retrobulbar neuritis. This volume is in quite general use by both students and practitioners and is more than a hand-book in dimensions and scope.

It is not within the design of this paper to go into the clinical aspects of disease of the sphenoidal sinus in its relation to optic nerve inflammation. The literature abounds in reports of interesting cases in which drainage and proper treatment of sinus empyemata have been followed by most satisfactory and brilliant results upon the course of neuritis. We wish, rather, to place before you certain facts concerning the anatomical relations of the optic nerve and commissure to the sphenoidal sinus and orbit based upon results of observations made upon specimens, thereby demonstrating the intimate relationship existing between the two.

The specimens upon which the studies are made constitute the greater part of a series which were collected and prepared by Dr. Gibson, and by him measured, data correlated and reported in great detail before the section on laryngology at the recent meeting of the American Medical Association in Chicago. In this report, which will soon appear in a forthcoming number of *The Journal A. M. A.*, Dr. Gibson demonstrated that the sphenoidal sinus was subject to great variation as to shape, size, extent, position, presence and absence of diverticula of various distribution. Our interest, however, is directed more especially toward points not investigated at that time, namely:

- 1. How much protection has the optic nerve and the commissure from the sphenoidal sinus.
 - 2. Diverticula extending toward the orbit.
 - 3. Observations concerning the blood supply.

In all, sixty specimens have been examined. The majority were taken at random from the dissecting room of the University of Buffalo, while the remaining few were obtained from other available sources. In getting the material together no attention was paid to race, previous history or sex. In this series the male predominates. It may be mentioned in passing that there is no appreciable difference in sinus wall thickness between the two sexes. The skulls are those of adults of various ages, the general average being somewhere near 45 years. The specimens are "dry," that is

to say, all soft tissues and membranes have been carefully removed and the bones thoroughly dried. Most of them have been prepared less than eighteen months, although a few of them are much older.

In most instances measurements were made by means of a carefully graduated steel rule. In some of the specimens the walls were so thin that it was absolutely impossible to saw them cross-section without destroying the wall itself. In such instances the wall thickness was estimated by its light transmitting qualities as compared to thin plates of bone of known thickness, care being taken that the source of illumination was equal in all cases. Every time there was any doubt, the measurement was over rather than under estimated. In this respect our data may be regarded as very conservative. On the whole, it has seemed to us that the specimens may be regarded as presenting a fair average of actual normal conditions as existing in adult life.

Undoubtedly what concerns us most is the thickness of the sinus wall, where it comes in close relation to the optic nerve, as the latter winds around the side and roof of the cavity, and further back, where it joins its fellow to form the commissure. In each instance, where the wall varied in thickness, as it nearly always does, for obvious reasons, the *thinnest* portion was measured.

MEASUREMENTS OF THE SINUS WALL AT THE INTRACRANIAL PORTION OF THE OPTIC NERVE.

					Ре	r Cent.
20	specimens	measured	0.25 mm.	(1/100 in.) or less, i. e		$33\frac{1}{3}$
18	specimens	measured	0.50 mm.	(1/50 in.) or less, i. e		30
				(1/25 in.) or less, i. e		
				(1/12 in.) or less, i. e		
				5 mm. or less, i. e		
				ŕ	_	
60	Total]	100

Thickness of Wall at Optic Commissure.—In all of our specimens we found that invariably the sinus wall in the region of the optic commissure was a trifle thinner than at the point measured along the optic nerve canal, but scarcely ever thicker. The two measurements corresponded so accurately in each instance that it seemed useless to tabulate a separate set of figures for the commissure. The same measurements and percentages may be taken for both commissure and optic nerve wall.

Diverticula.—In 85 specimens which were examined (all of the present series of 60, with 25 additional specimens in which it was impossible to complete sinus wall measurements) 15, or a trifle

over 17 per cent., presented diverticula which approached or invaded the orbital wall.

In addition to this it must be remembered that often there is a cell in the orbital process of the palate bone which may communicate with the sphenoidal sinus. In this event this cell becomes practically a diverticulum of the sinus, being continuous with its gravity.

Other Details of Interest.—In many specimens the optic nerve canal presented itself as a distinctly rounded ridge in the sinus wall, so that in some instances nearly one-third the nerve was so encompassed. This, of course, places the nerve in a much more exposed position as to the sinus than is usually found. Some specimens were found in the cases reported by Dr. Gibson, in which a large posterior ethmoidal cell completely over-rode the sphenoidal so that the nerve was not brought at all in contact with the latter.

Blood Supply.—The arterial supply is usually credited as coming from the spheno-palatine artery which passes underneath, but outside of the sinus. Careful inspection of recent specimens fails to reveal arteries of demonstrable size in the lining membrane of the sinus. Therefore, it would seem fair to assume that the sinus depends for its arterial supply, in part at least, upon the periosteum of adjacent cavities. The same assumption may hold good for the venous system. Nothing of definite nature is known of the lymphatics (Poirer and Cuneo⁴).

Is it not possible that on a smaller scale a circulatory condition obtains here similar to that existing between the dura and the scalp; two vascular membranes separated by a lamina of bone? Although in the case of the sphenoidal, for the heavy bones of the skull is substituted a thin, bony shell of paper-like thickness and one very likely extremely porous.

CONCLUSIONS.

We believe that these measurements and observations are interesting, if not significant. If the findings on these specimens are a reasonably fair indication of normal adult conditions and taken as they have been, at random, without regard to clinical history or cause of death, we believe they may be regarded as the normal index, it then follows that one-third of optic nerves and commissures are shielded from the sphenoidal sinus by a thin paperlike bony wall measuring a quarter of a millimeter (1/100 in.) or less in thickness. It is difficult to conceive how an inflammatory

^{4.} Poirer and Cuneo. "The Lymphatics."

process could go on in a sinus of this type without causing functional impairment, if not serious damage, to its neighboring optic nerve or chiasm. In instances where the optic nerve canal bulges into the sinus cavity in the manner described above, the nerve is more exposed than ever to possible morbid processes in the sinus. In nearly another third (30 per cent.) of individuals, this protecting wall, while double the thickness of the first third, measures one-half millimeter (1/50 in.) or less. With even this double barrier is it not likely that a lively suppurative process might readily invade a bony lamina of its thickness?

If our conclusions concerning the blood supply arrangement in the sinus are sound, one may readily comprehend the avenue by which infection might travel. Perhaps very much as the meninges are endangered by infective processes in the sinus.

Further, it is to be remembered that, in the great majority of cases the ostium of the sphenoidal lies in the upper third of the anterior sinus wall, that is, a third nearer the roof than the floor.

It follows that natural drainage is impossible until fluid has reached the level of this opening, and the sinus is two-thirds full. This condition of affairs means that the walls of the sinus as well as the floor are brought in intimate contact with infected material.

You will remember that about 17 per cent. of the specimens presented diverticula approaching and even invading the orbital wall, and that also in the orbital process of the palate bone is sometimes found a cell communicating with the sphenoidal, and such may be regarded as a diverticulum. In many instances the wall separating this diverticulum from the orbit is extremely thin. Is it not possible that disease in a sinus of this type might be responsible for some of the obscure cases of orbital inflammations? From an anatomical standpoint it is certainly possible.

It would seem that the data furnished by the study of these specimens would emphasize anew the importance of serious consideration of possible sphenoidal disease, as well as affections of the other accessory nasal sinuses, in all retrobulbar inflammations of the optic nerve, the origin of which is not definitely accounted for by other distinct causes.

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DISCUSSION.

Dr. Oscar Dodd:—This is certainly a very interesting subject. Some cases I have had were undoubedly due to inflammation of the sphenoidal sinus, and I have been surprised in other cases where there was severe inflammation of the sphenoidal sinus that we did not get earlier trouble with the optic nerve. In one case that came to autopsy under my observation there was great distension of the sphenoidal sinus, and from

the history secured later I found the to table had been going on for two or three years. I followed the case carefully and the optic nerve showed no signs of trouble until the general signs of meningitis occurred. It surprised me very much, for the walls of the spenoidal sinus were practically destroyed by the long-standing infection. I think in cases of optic neuritis we should be very careful to consider this anatomical relation, and I wish to thank the essayists for their splendid demonstration.

Dr. Stucky:—I would ask the essayist if he has noticed any difference in the size of the two sinuses of the sphenoid in these cases of optic neuritis. I have had five cases in which there was marked nerve lesion as a result of sphenoidal inflammation. Three were on the right side and the sinus was small; two were on the left side and the sinus was large. I wondered if there is any difference in the thickness of the wall separating the sinus from the optic nerve on the right and the left side. In one case where the vision was only 22/100 there was an operation on the sphenoid and the vision improved 50 per cent. in three weeks. Three months later it was found the patient had a frontal sinus trouble which evidently was overlooked at first, and the operation on this restored the vision completely.

DR. FRIDENBERG:—One reason this is not seen more frequently clinically is that there are such wide varieties of anatomical relations. In one case there may be a very thin wall between the optic nerve and the sphenoid and in another a thick partition. Another thing is the symptomatology. The diminution of vision does not come on until late, and as the symptom is unilateral the patient is apt to overlook it. The main change is in the color field, but vision may be good until the late stages of the disease.

DR. Wood:—I am sure those of us who have held that an association of this sort is justified will be pleased with this paper. Here we have considered one of the many connecting links that join the ophthalmologist and rhinologist. I further sympathize in the work done by Dr. Francis and Dr. Gibson from the fact that twenty years ago I spent several months in a Vienna laboratory investigating the neighboring sinuses in their relation to the orbit. I had an opinion then that there was something more than mere contiguity in these sinuses. I am sure we are all grateful for a paper like this, that should throw light on the relation between sphenoidal disease and ocular affections.

DR. Jos. BECK:—Not only the size and thickness of the sinus wall must be taken into consideration, but the etiological factor and the kind of infection we have. As the last paper has shown, retrobulbar neuritis has taken place in thick walled sinuses, simply because we have had a very virulent process, so that while the thickness of the wall between the commissure and sinus is important, we must not forget the nature of the organism. I have in mind a case of retrobulbar neuritis without sphenoidal signs and not diagnosed by the rhinological examination. The diagnosis was made in absence of sinus trouble. The retrobulbar neuritis was treated on another basis, thinking it was toxic, when it was shown later that it was the pent up secretion in a sinus, without any evidence of it whatever. This is a very timely subject that calls attention to the relation of the sinus and the retrobulbar neuritis.

Dr. Holinger:—Dr. Francis' paper is interesting to us, but, permit me to ask, what is its practical value? As Dr. Beck says, the nature of the suppuration is of much greater importance. Is there in a given case any data from which we can draw conclusions as to the possibility of a thin wall or a thick wall? One of these specimens is especially interesting. It shows on one side a thick wall and on the other a thin one, so that in the same individual there seems to be no absolute rule

as to the width of the cell-walls at this place. The heavy bony structure of the individual in this case could not be an index. It is a similar question as in the ear: the distance between the lateral sinus and the posterior wall of the external meatus. There is, however, an important difference, namely, that in the ethmoidal cells the width of the opening is of great importance. Supposing there is a suppuration in a cell with thick walls and a small opening, then there will be more danger for retention and perforation than in a cell with thin walls and a large opening, consequently free drainage.

Dr. Stubbs:—Did I understand Dr. Francis to speak of a cell in the lachrymal bone? In the embryological development of the ethmoid bone we find it consists of several plates or stages, the most anterior called the processus uncinatus. Ordinarily this does not contain any cells, but occasionally it does and they even push forward and upward into the frontal sinus. But I am not familiar with any cells in the lachrymal bone either from my own investigations or in my study of others. If Dr. Francis has so found cells there it is interesting, and I believe new. And even if he has so found them there I can not see how they can directly communicate with the sphenoid. I wish he would make this point clear.

Dr. Albert H. Andrews:-This is a subject in which I have been considerably interested, and I have made some investigation, I have tried in my study of the sphenoidal cavity on the cadaver to see some relation between the different cavities and have not been able to do so. I have found a large frontal sinus with a small sphenoidal cavity, and vice versa. I have tried to see if there was any relation between the sphenoidal cavity and shape of the antrum of Highmore, and have been unable to discover any. It is my impression, from the few cases I have seen, that there is little relation between eye trouble and the anatomical arrangment of the sphenoidal cavity. There have not been a sufficient number of autopsies held on subjects who have had optic neuritis from sphenoidal disease to say anything positive along this line. My impression is that it is due to the character of the infection rather than the thickness of the wall, as Dr. Beck has said. There is an enormous field for study here, and it seems to me that those who have done most in this field have only barely started in the work that should and will be done.

Dr. Jackson, Denver:-Such studies as this have certainly great educational value, and great value in keeping before our minds the possibility of such a connection; but clinical problems will be solved largely by clinical observations. The severity of the infection may account for some cases, and in others the thinness of the wall. But the entire absence of the wall, as seen in one of these cases, might permit a very ordinary infection to cause the symptoms. I think the best study of the subject in the direction of practical clinical results is that of Birch-Hirshfeld. He puts it forward as worthy of careful bearing in mind and further investigation, and as probably true; that the central scotoma which is so generally associated with retrobulbar neuritis, not clearly due to other troubles, is probably due to sphenoidal disease, whether other symptoms are present or recognized or not. He reports four cases, I think, of his own, and gleans some from the literature that seem to support this view. It is not simple loss of vision, but that peculiar loss of vision which is significant. He accounts for it as probably through pressure, possibly from the sinus from absence of the bony wall, more frequently from inflammation around the optic nerve; and that the pressure acts through rendering these peculiarly sensitive nerve fibers more sensitive to the toxic influence exerted through the presence of a pyogenic infection. For that reason the failure is

sometimes, or often, a functional failure of these particular nerve fibers,

and it is likely to be brought about early.

DR. FRANCIS (closing):-This specimen which I hold in my hand answers Dr. Stucky's question as to the relative thicknesses of the sinus walls in the same skull. Here it may be seen that the right sinus presents a very thick wall, while the wall of the left sinus is comparatively thin. I can not say which wall is usually thicker. Dr. Beck remarked that the kind of infection is of more importance than the sinus wall thickness. I appreciate the importance of his remarks and on the whole agree with him. However, in a paper of this sort it seemed wiser to us to take a concrete anatomical fact as a basis of study than a more abstract one, like possible kinds of infections. Dr. Holinger asks if such a study has any practical value. We think it has a very practical value if it does no more than call our attention to the rôle which sinus disease may play in optic neuritis. You may remember that even a fairly well known American text-book on Ophthalmology forgets to mention the subject. It would seem that that in itself is fair evidence that a little more attention may well be paid to this point. We did not attempt to take up the clinical aspect of this subject, that being entirely beyond the purpose of this paper.

Dr. Gibson (joint author, closing):-With regard to the cell in the palate bone, there is such a cell, not always present, but when it occurs it is found in the orbital process. It is by means of this cell that a communication between the sphenoidal sinus and the maxillary sinus may occur. The cell wall is frequently deficient on the sphenoidal side when it then forms a diverticulus towards the orbit. We have not a specimen which shows this arrangement. The cell in the ethmoid referred to is not in close enough relation to be taken into consideration in this paper. The relationship in size between the various sinuses follows no rule so far as my specimens show, there may be a large sphenoidal sinus and small frontal and maxillary sinuses, or the latter may be also large. About 3 per cent, of skulls present no sphenoidal sinuses at all. I agree with Dr. Andrews that there is no relation between a large frontal sinus and a large sphenoidal sinus. An operator can not foretell whether he will find a large sphenoidal sinus or a small sinus, or, indeed, whether there will be one at all. So far as my part in this paper is concerned it is from the anatomical and not from the rhinological or ophthalmological point of view.

PSEUDO-OPTIC NEURITIS.

THEODORE B. SCHNEIDEMAN, A.M., M.D. Professor of Diseases of the Eye, Philadelphia Polyclinic.

A striking anomaly in the appearance of the optic nerves as observed with the ophthalmoscope has been recorded from time to time by different writers. The condition in question closely simulates inflammation of the nerve-indeed it is almost or quite impossible to differentiate it from true inflammation by the ap-Repeated observations extending over a considpearances alone. erable length of time with careful testing of the functions are necessary to arrive at the proper diagnosis. The condition meant is not simply the slight blurring and somewhat veiled appearance of the disc, which are quite common, especially in uncorrected hypermetropia and astigmatism, but a much more marked anomaly—this consists of a decided prominence of the papilla (if it were really inflammation it would be called swelling), the outlines of which are very indistinct or even obliterated, so that the raised surface shades imperceptibly into the adjacent fundus; the color is heightened, the vessels are somewhat tortuous. In these respects the appearances hardly differ at all from true inflammation, so that the observer has at first no other thought than that he has before him a true optic neuritis. The swelling of the disc is considered to be due to an exudate, but there are of course no hemorrhages. Subjective symptoms are, however, entirely absent, both visual and cerebral. Central vision is unimpaired and the fields show no contraction for form or color. The condition is congenital and has not been found to change during observation extending over years.

The anomaly in question would no doubt be more widely known were it not that, like opaque nerve fibers, it gives rise to no subjective complaints, and hence is not liable to come under ophthalmoscopic examination. On the other hand, the condition has been frequently misunderstood, especially, as is well known, true optic neuritis may occasionally persist for a considerable period, months and even a year, and more, without marked changes, or subjective complaints.

The writer has seen this well illustrated in a recent case of his own, in which the signs of true optic neuritis (choked disc) persisted for more than a year with almost unimpaired central vision and but slight contraction of the fields, so that the patient and her friends were loathe to believe in the existence of a disease seriously threatening the sight, not to say life. And so no doubt many cases of the congenital anomaly must have been not rarely considered as true neuritis.

The writer has had the opportunity of observing two typical cases in sisters, covering in the one case a period of 13 years and in the other 9. The histories are briefly as follows:

E. S., aged 8, when first seen in 1895 was practically emmetropic with full vision. Pupils normal. Media perfectly clear. Right disc red, nearly circular, slightly prominent, about 1 D. above the surrounding fundus. The outline upon the nasal side quite obscured. Left disc presents the appearance of marked optic neuritis, which in fact was diagnosed. The outlines were almost entirely obliterated. Its prominence measures 2.5 D. above that of the surrounding fundus; it is "filled in," with no trace of a cup. The color is deep red and it is surrounded by a grayish area or halo extending into the neighboring retina; the vessels are slightly tortuous, but the normal relation between the diameters of the arteries and veins is preserved. The visual acuity equals 6/6. The fields are of normal extent.

The appearance of the optic nerve has remained unchanged since 1895, during which time the refraction has become myopic, 2.5 D. in each eye, with slight astigmatism.

Case 2.—M. S., sister of Case 1, aged 9 when first seen, under observation at frequent intervals for nine years. Right eye pupil normal, low hypermetropia, media clear, disc almost the exact counterpart of the sister's left. Vision 6/6, fields normal for form and color. Left eye, prominence of disc very slight, outline defined except for part of quadrant on nasal side. This disc is merely suggestive, hardly enough to attract attention, were it not for the marked appearance of the other eye.

A unique feature in these cases is their occurrence in sisters, a fact which strengthens the assumption of their congenital nature. Almost all reported cases to be referred to later gave evidence of other congenital ocular distrophies, such as high hypermetropia, astigmatism, lenticular opacities, etc., none of which were present in either of these. Case 1 has become moderately myopic during the period of observation.

De Wecker appears to have been the first to have called attention to the condition. He warns the ophthalmologist not to confound it, especially in children, with coincident febrile movement with beginning optic neuritis. Galezowski also figures a case in his atlas. The subject was affected with toxic amblyopia, the

latter recovered entirely, but the appearances of the nerve persisted. Galezowski ascribes the appearance to imperfect transparency of the fibers of the optic nerve. Harlan describes two cases, one of which was undoubtedly and the other possibly an instance of the anomaly. Uhthoff found a similar condition nine times out of 1,800 subjects, while examining the evegrounds of the inmates of an insane asylum. He adds that this occurred exclusively in conjunction with other congenital anomalies, particularly of the refraction. Dobrowolsky called attention to a hazy condition of the fundus with unimpaired transparency of the media in high degrees of hypermetropia; this haze did not affect the papilla alone and its immediate surroundings, but involved the entire retina so that these cases do not strictly belong to the anomaly in question, though related to it. He believes with others that the phenomenon is connected with strain of the accommodation, although the connection is not obvious. A similar condition has been described as following diphtheritic intoxication. Bristowe has made perhaps the most exhaustive study yet published. He calls it the hypermetropic papilla or pseudo neuritis and states that it is a condition in which the disc appears covered by more or less haze, which affects particularly the nasal portion, although the entire nerve head may be involved, accompanied by such a degree of swelling that the vessels assume a tortuous course. As a proof that true neuritis is not present the appearance does not change, and all cerebral symptoms are absent. Of 125 hyperopes examined by him twentynine showed the hypermetropic papilla. There was no definite connection between the degree of the hypermetropia and the presence or extent of the anomaly. Like Landolt, Donders and others, he regards the hypermetropic eye as an undeveloped organ, but he does not agree with Landolt that the hypermetropic papilla is due to a defect in the nervous apparatus, seeing that the visual acuity is generally normal. Bristowe agrees with Loring that the appearance is due to an excess of connective tissue elements causing the papilla and the adjacent retina to suffer in transparency and giving the appearance of radiating lines. Marcus Gunn has also described hypermetropic congestion of the papilla. Spicer records a case of 3 D. swelling of the disc with indistinct outlines in an emmetropic boy, which he observed for three years without change. In the discussion upon this case Hartridge refused to admit the term spurious and thought that Spicer's case was one of protracted optic neuritis. Spicer correctly observed that it is unthinkable that such a delicate

structure as the optic nerve should be subject for a number of years to disease without occasioning the slightest disturbance of function.

Burkholder, in a paper entitled "Fundus Lesions with Normal Vision," records several cases of pseudo papillitis which were at first believed to be true inflammation, and treated accordingly.

Konigsberg has also called attention to the resemblance the optic discs occasionally show in hypermetropia and hypermetropic astigmatism to optic neuritis, which may be increased by combination with tortuosity of the vessels, or by hyperemia of the disc in febrile conditions.

Faith records a case in a girl with short sight and hysteria who presented a pair of swollen discs, with blurred outline, which simulated in appearance optic neuritis.

Nottback has published an exhaustive article upon the subject, reporting a number of cases.

It appears then that a condition of the optic nerve simulating the appearance of inflammation occasionally occurs. Those who have never seen it are disposed to doubt its physiological or congenital nature and deny the correctness of the designation "spurious," but where such a condition has been observed to remain unchanged for many years with entirely unimpaired function, it is impossible to admit the existence of true inflammation. The occurrence of the same anomaly in two sisters, as here, is, to say the least, highly suggestive of a congenital origin. It is also suggestive that the refraction in one of these cases was hypermetropic and the other myopic, tending to show that it is independent of the refraction.

DISCUSSION.

DR. VAIL:—I have seen this particular form of trouble. The patients come in usually with symptoms of hypermetropia. The ophthalmoscopic examination indicates an unusual degree of hyperemia of the optic disc. The objective and subjective tests employed fail to reveal the slightest evidence or symptomatology, and observations later always reveal the condition to be the same. It is a very interesting condition and one which we should recognize at once so as not to frighten the patient. One of my cases was alarmed by some one who made a diagnosis of optic neuritis and was confined to a dark room for a number of weeks until he developed neurasthenia. When I saw him I assured him that the condition was just as it was three or four years before and that he would not go blind.

Dr. Wood:—I wonder if Dr. Schneidemann has seen the beautiful painting by Dr. Beard, of Chicago, of a typical instance of pseudo-optic neuritis. The drawing, reproduced in the *Ophthalmic Record* some years ago, is one of the few instances where the fundus coloring has been accurately reproduced by means of any color scheme, a result which, I regret to say, is not reached in the majority of fundus pictures. The reds, suggestions of yellow, etc., were faithfully depicted in the illustration referred to.

In this case there were between three and four diopters of swelling of the disc, and the tissues were not as transparent as they usually are in the projected tissues of high hypermetropia. That is a distinction which should be borne in mind in some of these cases where there has probably been an intra-uterine infection, and after the individual is born we see the remnants of that inflammation. In such instances the optic swelling is not of the usual transparency; the outline is not only blurred, but there is an extension of the swelling into retinal areas. The vessels are abnormal, swellen and inclined to be tortuous, but there is, as a rule, the normal relation in size between artery and vein. The fields are of the proper size; central vision is good. Dr. Beard's case was exhibited before the Chicago Ophthalmological Society, and has been examined a number of times, at intervals, by Dr. Beard.

Dr. Edw. Jackson:-Within a month I have seen a case, that I first studied eight or nine years ago, that impressed me with the practical importance of this condition. I think that when it is uncomplicated in any way it is possible to recognize it, and distinguish it from a neuritis, perhaps, at the first thorough examination. But it is quite possible for the patient to come in a condition where it is more difficult to make the differentiation. This case was that of a young man who, previously healthy, had within a few months begun to suffer with severe headaches, and came with one optic disc entirely obscured and the other very hazy, and with quite a good deal of eye-strain neuritis. Perhaps the greatest difficulty in making a differential diagnosis would be between this condition and the hyperopic neuritis or the neuritis due to eye-strain, rather than the choked disc of cerebral disease. It was some weeks before I could make up my mind certainly that this case was not a neuritis, or was this congenital condition complicated by slight neuritis. But after watching it a few weeks I decided, and within this month he has been in, after eight years, with no change since he recovered from the temporary condition at the time. The symptom I have relied upon is that (when there are no complications) there are no vascular changes. Even in this case the thing that made me hopeful was that, though the vessels were engorged, there was no disproportion between the arteries and veins.

Dr. Vail:-Were there in this case supernumerary vessels?

Dr. Jackson:—More fine vessels than normal, but no large tortuous new trunks.

Dr. Vail:—I counted eleven good sized vessels in the case I referred to, but the arteries and veins were of normal proportion.

DR. W. REBER:-Within the last year I have had an opportunity to see one of these cases that prior to that time I should have been inclined to doubt the existence of. A young woman of 28, a trained nurse, the sister of a previous patient, came to me for refraction only. Slight headaches were the only symptom. The description Dr. Schneideman has given of his first case describes absolutely the appearance of this young woman. The nerve head seemed swollen about 3 D. The relation between the arterial and venous circulation was normal. Repeated examinations of the visual fields were absolutely negative; no retinal diseaes, no disturbance of metabolism, no accessory sinus disease, no nasal disease-in short, she was a splendidly healthy young woman. It was impossible to bring the vision above 5/71/2. The only possible clue was that another sister I had seen (and I have seen three in this family) had had what might have been specific iritis or iridocyclitis. That made me a little suspicious, because the sister was unmarried and there was a history that the grandfather had lived to the flesh with all his might and main. After three months the patient led up to that phase of the case and drawing false conclusions from some remarks I made became much alarmed and consulted Dr. de Schweinitz, who wrote we that he thought it was pseudooptic neuritis of congenital origin. I then wrote to the first sister, and on looking up the notes found she had presented practically a similar condition. It seems to me that these are probably congenital cases.

DR. HENRY GRADLE: -- I have had the opportunity of seeing a case of presumable pseudo-neuritis complicated with true neuritis. A woman with specific history and evidence of gummatous meningitis (headache and various ocular pareses) had distinct moderate papillitis in the right eye, as shown by the swelling of the disc, tortuosity of the veins and the presence of a retinal hemorrhage. Her sight was reduced to 20/40. Under active treatment she recovered completely with normal sight in about one month. But when last seen the disc was still swollen and the edges effaced. She did not return for twenty months, stating then that she kept up continued medication for months under the direction of her family physician. A few days ago dizziness returned and her right eye again became dim with an occasional spell of considerable temporary failure of sight. She had now again optic neuritis in the right eye, but no pupillary or muscular pareses. Sight was reduced to 20/40 minus. Again she recovered functionally completely in about three weeks. The optic neuritis receded moderately but not entirely. Energetic treatment was continued under my own observation for about five months. At the end of that time she was functionally normal in every respect, but there was still a slightly swollen nervehead with indistinct edges and opalescent appearance. vessels had become entirely normal and no atrophy had occurred.

Dr. Fridenberg:—Whereas, as a general rule, we have plenty of time to make a diagnosis in these cases, we might meet with a case of pseudo-optic neuritis where it was important to make the diagnosis in a short time. In otitic disease where the question of sinus involvement or other intra-cranial complication would come up we might have to decide whether it was a pseudo-optic neuritis or one due to the otitic disease. The same would hold good in an accessory sinus involvement. It seems to me that a large number of ophthalmoscopic appearances in these conditions can be attributed to the fact that we are looking at the fundus through a magnifying glass. The cases are almost invariably hypermetropic without astigmatism and the cases of absolute myopia are extremely rare. When you see a large disc with large vessels, a good deal of the apparent magnification of the disc and the curve of the vessels can be charged to the fact that we are looking at them through a plus lense.

DR. SCHNEIDEMAN (closing discussion):—In looking over the literature of this subject it is interesting to find that those who have themselves had the opportunity of observing this condition, are confident that it is not inflammation, while some whose knowledge of it is derived from reports of cases are not inclined to accept the view of its innocent character. I am convinced that any ophthalmologist who sees the cases that I am reporting for the first time would be convinced that true optic neuritis was present. I can hardly help thinking so myself every time these young ladies call, and yet the appearances have not changed in the one case for eleven years and in the other for thirteen.

The opposite error of regarding true inflammation as the pseudo variety has occasionally been made. This is especially liable to occur in children or the insane where functional tests can not be satisfactorily carried out.

THE OPHTHALMIC ORIGIN OF OTIC DISTURBANCES WITH THE CEREBELLAR CONTROL OF THE EYES.

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The argument of a medical thesis is more easily understood and more accurately followed if its propositions involved are clearly stated at the beginning. I desire to say at once, therefore, that it is my purpose in this paper (1) to call attention to the fact that clinical evidence shows that such relationships exist between the eye and the ear that an irritation or improper functioning of the former may be manifested in a disturbance of some character in the latter, (2) to show anatomically what these relationships are, (3) to show that a complexus of symptoms closely resembling those of Ménière's disease may be produced through inco-ordinate action of the eyes, and (4)—and this is of especial importance—to show that in the physiology of vision the cerebellum exercises governing functions.

Concerning the first point, the establishment of the conclusion that an irritation of a disturbing character may be transmitted through the mechanism of the central nervous system from the eye to the ear would almost necessarily assume as its corollary the reverse proposition, that a like influence may be exerted through the ear upon the eye. With this phase of the subject the present paper will not deal.

While examining the refraction some years since of a woman not yet presbyopic she mentioned incidentally that for some months she had been under the care of a distinguished otologist seeking relief from an annoying fluttering and tinnitus affecting her left ear. The Eustachian tube was quite patent and there was no retraction of the membranum tympanum, nor was there an actual loss of hearing, but a confusion was produced in the act of conscious attention that was most disturbing. These facts were recorded as a part of her case history, and her refraction was determined. Her eyes seemed to be free from disease of any kind, and she complained of nothing except discomfort in using her eyes and an increase in the ear symptoms when the eyes were used for close work. Her refraction was carefully taken and she was given the following prescription for glasses for constant wear, and was not seen again for

several months: R + 0.50 D. cyl. ax. 15 v-20/20 L. 0.62 D. cyl. ax. v-20/20. Her muscle balance showed orthophoria. She then reported that shortly after having assumed glasses, to her astonishment and to mine, not only were her eyes made perfectly comfortable, but the disturbance of the ear also rapidly and entirely disappeared. There was no return of any of these symptoms for more than a year, when her eyes again became somewhat uncomfortable, and with this her attention was called to the same distressing sensations in the ear. A slight alteration in the angle and strength of her cylinders was found necessary, after which she again found perfect relief from both of the conditions from which she had suffered.

An association of functional disturbances seemingly correlated and involving both the eye and the ear seemed to me to be most unusual and most important. That organic changes involving the meninges or the brain structures may affect both the sight and hearing is common knowledge, but that an irritation having an origin in the eve may be transmitted to the ear was at that time absolutely novel in my experience. The woman was, indeed, somewhat neuropathic. She had been subjected to a nervous strain resulting from domestic unhappiness and her nervous system was, therefore, more keenly alive to impressions, but the fact that such impressions can be, and in even one instance were, carried through the nerve centers controlling the eves to those governing the auditory mechanism, is of profound importance in charting the pathways of associated functions in unknown parts of the brain, and possibly contributing to our knowledge of pathologic conditions that are now obscure.

My attention having been directed to the possible relation between these two organs, three questions naturally presented themselves.

- 1. Was this a unique manifestation or has it been observed by others?
- 2. If the pathway exists through which impulses which originate in or are carried to the eye centers may be conducted to those of the ear, may not other sensations follow these same channels?
 - 3. Through what mechanism must this be accomplished?

Before having an opportunity of investigating the literature touching on this subject, some additional facts occurred under my own observation. Another patient, again a woman, presented herself with that exceedingly common evidence of eye strain, pain in the back of the head extending down into the neck, but the peculiar association symptoms—which I have since noted in many cases—was an intense but transitory pain extending deep down into the ear. The pain was on the side in which it was greatest in the neck. The correction, with proper glasses, of the eye strain which relieved the pain in the neck at the same time relieved that in the ear. We have then another possibly associated symptom—that of pain. Since having my attention awakened to possible relationships of this kind I have noted not once, but many times, sensations of vague discomfort—a fullness, or stuffiness, or sensation as of water in the ears—which have been referred to the ear, which have been increased by the use of the eyes, and which have disappeared with the relief of the symptoms of the head for which glasses had been prescribed.

Associated with this complexus of symptoms is another not often ascribed by neurologists to a condition that is probably more frequently its true source than any other, and that is ocular vertigo. Peterson and Church describe six different causes of vertigo, but do not mention the eyes as one of them. The following is a typical instance:

F. M. H., aged 44; merchant. While engaged in his business during the past three months has had repeated and increasing attacks of dizziness. Things seem to whirl rapidly around; he grows pale and apprehensive. Has never worn glasses with regularity, those which he had occasionally used being focally incorrect. In recent attacks vertigo was so intense that he was obliged to lie down. Was unable to walk because of dizziness and was brought to my office in a carriage.

His muscle balance was normal, but his refraction under cycloplegic showed: R. + 0.50 D. sph. + 1. D. cyl. ax. 180 v—20/20. L. + 0.25 D. sph. + 1.25 D. cyl. ax. 180 v—20/20. He was given bifocal correction, the addition being R. + 1 D. sph.; L. + 1 D. sph., with the effect of quickly, entirely and permanently relieving the dizziness while the glasses are worn. It can be readily brought back by leaving them off.

The following case is exceedingly interesting in showing the wide range of nervous sensations having an eye strain as their origin:

Mrs. H., Rochester, N. Y., aged 53. For nearly a year past had suffered with pain in the left ear. Sometimes the sensation was one of burning, with a feeling as of wind in the ear. Ear gets very dry and wakes her up in her sleep. Has for a number of months been under the care of an otologist and had the ear treated and the Eustachian tube inflated. Conscious of a swaying feeling in a crowd. Can not go alone into a store to shop. Has had intense and continued neuralgia in the left foot in the region of the instep. Sensation of weakness in the ankle as though it required a support, but the pain was so intense that she could not wear one. Had

twitching of the left eyelid. Tendency to insomnia. When once awake can not sleep for the rest of the night. Can not walk alone in the street because of unwarranted sensation of fear. She was wearing glasses irregularly which had been very carelessly chosen. Her refractive test showed: R. + 112 D. sph. + 25 D. cyl. ax. 120 v—20/20; L. + 112 D. sph. + 50 D. cyl. ax. 30 v—20/20; add

OU + 225 D. sph.; Jaeger-1; esophoria 3°.

She was given full correction with bifocal glasses for constant use. On May 14, the occasion of her second visit, she reported marked improvement in all of her nervous symptoms. The pain in her foot and other sensations of discomfort has wholly disappeared and her nerves were under better control. On September 4, the occasion of her third visit, she had suffered a nervous shock in the instantaneous death of a brother who had seemingly been in perfect health, but there was no return of any of the symptoms involving the head, face or foot. She has not attempted to go without her glasses, feeling quite unable to do so without a return of the nervous condition from which she had previously suffered.

The following is perhaps one of the most typical cases that has come under my observation, and the case history was written in a subsequent letter by the patient's wife, he himself being a physician:

W. H. D., physician, aged 41; habits strictly temperate. For eighteen years had had severe headaches with nausea and vomiting, apparently caused by fatigue, and frequently accompanied by feeling of faintness. About twelve years ago noticed roaring and deafness in right ear. Ear treated by specialist for short time. Used left ear for diagnostic purposes entirely. About ten years ago pupils of the left eye became dilated and there was twitching of the eyelids. Consulted ophthalmologist, who said there was some third

nerve trouble, and prescribed OU + 50 D. cyl. ax. 180.

In October, 1905, was taken suddenly with vertigo. Was very much confused and bewildered for about ten minutes. Again in October was taken with vertigo in his office and would have fallen but had assistance. Was apparently unconscious for over an hour. Realized something of what was passing, but was unable to signify any consciousness. This was accompanied by an attack of nystagmus. Whole sensation that of "being caught up in a whirlwind." During another attack in August, 1907, was obliged to lie down on floor to prevent a fall. This was followed by nausea and vomiting, and the next day by pain in the head and nausea. Always before these attacks felt unusually well. Between attacks up to January, 1908, suffered with sick headache every few weeks. Was taken again with vertigo on January 18, and for the three weeks following had from three to four attacks in twenty-four hours, sometimes accompanied with nausea. Was confined to bed and would have attacks during sleep, especially if lying on back or right side. When awakened by vertigo—usually between 2 and 3 a.m. would lie awake until davlight for fear of recurrence of attack. On January 23 fell as he was being seated in street car. That time fell to the right, but at other times was unable to tell in which

direction he did fall. Could find no one thing that would always bring on an attack. An attack sometimes followed a quick turning of the head, bending over, looking up quickly, and sometimes occurred during a meal, about an hour after eating, or from the motion of the cars or carriage. At other times there would be no vertigo under apparently the same circumstances. Pulse during an attack was from 48 to 58, while normal rate was from 60 to 66. After January 18 sick headaches disappeared, followed by fullness and pressure at base of the brain. Circulation very poor. Hands and feet cold much of the time, particularly at night. While confined to his bed during severe attack voided large quantity of lightcolored urine, which on examination showed an immense amount of solids and at times a trace of indican. Had troubled sleep, with feeling of weakness in morning. Breath offensive. when he had breakfast in bed, and twice when he dressed before eating had attacks of vertigo about an hour afterward. Seemed to feel better in the afternoon than in the morning. From February 3 to March 11 had no return of the vertigo and felt pretty well except for the pressure and fullness in the head which was always present.

On March 11 was taken suddenly with vertigo. Symptoms same as before, with exception of one day's continued nausea and vomiting, which was more severe than ever before. Continued having attacks of vertigo every day until on March 29, while in conversation with a man, without warning of dizziness or nausea, fell to the floor. Fell to the right, and the attack continued with more or less severity for about an hour. On March 29 came for an examination and gained relief from the pressure at base of brain through the use of the homatropin.

The examination showed the eve-ground to be perfectly normal. The homatropin test gave the following equation: R + 0.25 D. sph. + 87 D. cyl. ax. 15 v-20/20; L. + 0.25 D. sph. + 75 D. cyl. ax. 165 —20/20. He had ten degrees of exophoria at proximal range. He was given an over-correction of one dioptre to wear constantly because of a belief that the homatropin correction was not as complete as it should be, as it is frequently found that the employment of a process of fogging will bring out results not obtained under cycloplegic. On April 9 was feeling so well that he wrote continuously for two hours on an address for a medical society. In the evening complained of pressure in the back of his head, and was unable to finish writing. About 3 o'clock next morning awoke with severe headache, which continued throughout the day and prevented any further writing or attention to office work. At 11 o'clock of the morning of April 9 vomited and was dizzy for the rest of the morning. That was the first time his accommodation had been taxed to any extent. From this time the condition constantly improved. On April 19 the refraction showed R. + 37 D. sph. + 87 D. cyl. ax. 15 v-20/20; L. + 62 D. sph. + 87 D. cyl. ax. 165 v-20/20.

In July a letter reported some return of the vertigo, "with a less

degree of severity but quite often." An examination made by a most careful internist, including blood count, urinary analysis, etc., was negative, and the diagnosis was intestinal toxemia produced by eve-strain. It was evident that the bottom of the case had not been reached. By July 30 he was able to take + 0.62 D. sph. on each eye with the same cylinders, and this he was given, with a + 1 D. sph. additional in the form of a bifocal correction.

The last letter reported an entire freedom from vertigo and a general feeling of well-being such as he had not experienced since he had been ill. He had during this time taken holadin for the intestinal condition, but the slightest over-effort on the part of the eves or the disuse of the glasses would readily cause a recurrence of the former symptoms. On September 3 he still reported no return

of the vertigo.

The report of his ear test on Sept. 3, 1908, was as follows: Left ear normal; right ear, whisper at three feet; watch, one inch, better on contact with external meatus than on mastoid; gelle, neither positive nor negative; Weber, no; Schrapnell, slightly relaxed; tinnitus, roaring like running water in distance; duration, twelve to fourteen years.

Negative Equal Positive Positive Positive A.C. 38 0 19 6 65 25 31 13 Schwabach B.C. 16 8 4 24 8 13 6 13 0 C_3 C_2 C_{i} C_{4} T.F.

Rinné, with fork C, air conduction, feels the vibration but does not hear it. C₂ and C₃ bone conduction very faint; nose inf. turb. engorged at times; tubes, open.

We have in this case an almost typical symptom-complex such as has been commonly associated with pathologic labvrinthine changes, and this case had, indeed, been diagnosticated by careful observers as Ménière's disease, but he was of an age when presbyopia had begun to be manifest, he obtained immediate though temporary relief from cycloplegic, his refractive anomaly had not been fully corrected, and he has gradually but certainly recovered under the relief of his eye-strain.

When, as not infrequently happens, with vertigo is a more or less persistent ringing or roaring or fluttering in the ears on one or both sides with some impairment of hearing and associated with nausea, we have all of the elements that were described by Ménière as a labyrinthine involvement, except the sudden and complete loss of hearing, and as there has been much doubt concerning the few cases in which labyrinthine changes have been verified by postmortem examinations, I am led to inquire, may it not be that after we have eliminated that rare condition of labvrinthine hemorrhage, together with those cases of known aural origin, those having a syphilitic basis and those dependent upon a basilar neoplasm, that with our later and more exact clinical knowledge of the etiological relationship of eye-strain and vertigo, and our more complete studies of the finer neural anatomy, we may not be obliged to

reverse our conclusions and consider that there may be a symptomcomplex which we have heretofore supposed to be labyrinthine but in which the eyes and not the ears give rise to the pathologic disturbances.

The warrant for such an apparently bold departure from established teachings will seem to be justified when the facts are carefully taken into consideration. These facts are, first, clinical; second, anatomical, and third, pathologic. Says Politzer: "Although since Ménière's publication apoplectiform deafness accompanied by characteristic symptoms as described by him has often been clinically observed and described by aural surgeons, there is still doubt as to the correctness of strictly localizing the above combination of symptoms in the labyrinth." He quotes the traumatic case of Moos with hemorrhage into the periosteum of the internal cavity of the whole membraneous labyrinth in which neither subjective noises nor giddiness were present, and that of Lucae in which they were also lacking in a hemorrhagic inflammation of the labyrinth occurring in the course of a tubercular basilar meningitis. "In recent times," continues Politzer, "all subjective disturbances of hearing associated with noises and giddiness have been called Ménière's Disease or Ménière's complex of symptoms, disturbances of hearing, which, as we have seen, are also frequently observed in accumulations of cerumen, vegetations in the external meatus, in affections of the middle-ear, in many temporary congestions of the labyrinth or brain, after injuries or tumors of the brain," and he notes particularly that all of the Ménière symptoms were present in Wolf's case of tumor of the amygdala of the cerebellum. Knapp observed after an attack dimness of vision, and Moos transitory hemiopia with horizontal line of separation. These, together with our more recent observations, would incline in the belief that the real source of this group of classic symptoms is not the labyrinth, but that any irritation carried to the under brain from pressure, a reflex, or from what source it may come, will produce vertigo, nausea, ringing in the ears or deafness, and one other symptom that is pathognomonic of cerebellar disturbance, marked and ungovernable weakness of the legs.

As long ago as 1881 Dr. George T. Stevens, in a remarkable though brief paper read before the International Medical Congress of that year, entitled "On Certain Conditions of the Eyes as a Cause of Loss of Hearing by Reflex Irritation," enunciated some principles and cited instances that at least established a basis for future study in this important but hitherto unknown field of re-

search. He quotes the law that the same peripheric cause of irritation acting on the same centripetal nerve may produce the greatest variety of effects, including every functional nervous affection or disorder. "My own observation and experience," he said, "leads me to believe that reflex irritations affecting the sensations and malnutrition of the ears are not of unfrequent occurrence, and, indeed, they are much more common than would be supposed from the fact that so little attention—if any—has been bestowed upon them." This case being the first reported and of some interest is summarized here:

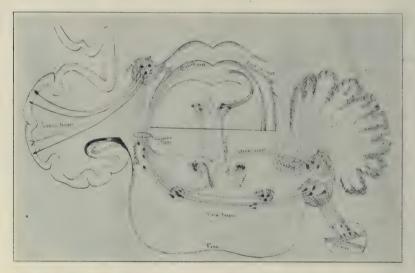
A lady of 42 was tormented by subjective sounds and her hearing was reduced one-half. The ears when examined gave no indications of disease. Inflations with Politzer's bag gave no relief, general tonics, electricity, bromids, a change of air, all failed to modify in any degree the tormenting noises which destroyed sleep, added to the general nervous irritability of the patient and made her miserable. There was slight insufficiency of the external recti muscles, and there were pains in the temples and brows. After three months of fruitless attempts to relieve the patient by such measures as have been mentioned, a partial tenotomy of one of the internal recti muscles was made. In a very few days the roarings and hissings ceased, the hearing returned to the normal standard, and the ladv was greatly improved in her general nervous condition. In this instance it is as certain as anything in medicine that the relief not only followed, but was the legitimate result of, the greater freedom of the eves, which up to the time of the slight operation had been kept constantly on the alert to maintain monocular vision.

The discussion which followed had no relation to the subject of the essavist's paper whatever.

In 1895 Dr. Arthur A. Boyer, in a paper entitled "The Relative Importance of Labvrinthine and Ocular Defects in the Etiology of Vertigo," and read before the Neurological Section of the Academy of Medicine, New York, after reviewing the subject elaborately, cited ten cases in which vertigo and lowered hearing were associated with refractive errors or muscular imbalance and which disappeared on the re-establishment of ocular sufficiency. It was not until the meeting of May, 1907, that this unusual subject seems to have received further attention, when Dr. Marcel Rollet of Blois, in a profoundly interesting and valuable paper read before the Societe Francaise c'Oto-rhino-laryngologie and published in the Revue Hebdomadaire for December last, presented further new observations and completely reviewed the entire subject in a paper entitled "de l'Influence de l'Oeil sur l'Oreille a l'état normal et pathologique" and adds to the observation already made. He arrives at the conclusion "that there exists between the organs of

vision and those of audition certain relations—both direct and indirect—relations which the nervous connections, both central and peripheric, of the two organs suffice to explain, and it must be admitted that in the case of objects which may be recognized by the two organs the excitation of the one of them may awaken through the association fibers the images of the memory belonging to the other organ.

That this conclusion is justified is shown in the relationship of the two branches of the auditory nerve with the motor nerves of the eye and the cerebellum. As Edinger has shown, "the roots of the abducens arrive by several extended bundles which pass through the tegmentum and the pons at the base of the pons externally.



Schema showing relationship of the two roots of the auditory with the cerebellum and fourth. The fasciculus long, also reaches to the third and is lost in the cord. After Edinger.

On the median side the nucleus is connected with the posterior longitudinal bundle. It is claimed, though not well proved, that these fibers enter the opposite motor-oculi nerve. Without doubt, however, there is a remarkable connection between the abducens nucleus and the superior olive. This connecting tract must place the acusticus in connection with the motor nerves to the eyes and is perhaps of importance for the maintenance of position in space." "The upper olives," continues Edinger, "interposed as they are in the central nerve fibers must be centers of importance—their constant occurrence through the entire list of mammals—their frequently large development and above all the wealth of fibers enter-

ing into relation with them are evidence of this. Among these fibers from the cerebellum, still but little understood, is a large strand from the center of the nervus abducens. Since in this center of the sixth nerve, however, fibers end which pass through the fasciculus longitudinalis posterior to the centers of the other motor nerves of the eye and to the thalamus, there is here apparently a well-organized synergetic apparatus well deserving further experimental research."

The way to find out the function of an organ is to observe its



The acoustic roots and their relationships. After Edinger.

actions under known conditions of stimulation. The cerebellum is so deeply situated and inaccessible because of vulnerable organs around it that coarse attempts at vivisection are unsatisfactory and untrustworthy. There are conditions, however, in which a known irritation has been excited by pressure, as in the case of cerebellar neoplasms in which certain symptoms are definite and unvarying. These symptoms can arise only from an irritation because where the pressure has become sufficiently great to abolish the function of the cerebellar tissues the irritative manifestations cease and

death ensues. "A close functional relationship," says Lodholz, "has been found to exist between the semicircular canals and the cerebellum," and it is not without importance that the muscular exhaustion that is so frequent a symptom of eye-strain finds its extreme manifestation in the cerebellar pressure due to a neoplasm.

Perhaps the most uniformly common symptom of neoplastic involvement of the cerebellum is pain which is over the occiput and back of the neck. Aside, then, from "choked disc," which may arise from any intracranial pressure, "nystagmus" is one of the most frequent symptoms of cerebellar growths.1 The movements in nystagmus may be horizontal or vertical or both, at the same time, indicating the incoordination of all of the straight ocular muscles. Subjective vertigo is usually present. It is associated with nausea. The most characteristic symptom, however, is asthenia. In all five cases reported by Granger Stewart² the patients exhibited weakness of the legs not only on standing and walking, but also by movements in bed. Now it happens that each one of these symptoms, and especially the last, is an exceedingly frequent accompaniment of focal or muscular insufficiencies of the eyes. When patients are closely questioned it will often be found that the exhaustion of an eve-strain manifests itself in weakness of the calves of the legs. In a most excellent and recent review of our present knowledge of the Ménière symptom-complex, Goodhart says: "As the violence of the seizure abates and the symptoms subside incoordination and ataxia of the lower limbs become evident. Indeed, the Romberg symptom and varying degrees of ataxia are commonly present as permanent symptoms and are valuable diagnostic factors in the interparoxysmal periods. The ocular symptoms - nystagmus, diplopia, narrowing of the visual fields, subjective sensations, zigzag figures, etc.—show that we are dealing with the same brain area in the Ménière triad as that which has to do with the perceptive and motor functions of the eyes. "Indeed," says Goodhart, "closing the eyes, fixing upon a near object, tightly closing the lids or compressing the eyeballs sometimes favorably influences the vertigo."

Stephani's experiments, in which the Perkinje's cerebellar cells degenerated after the removal of the semicircular canals, justified the view that the canals are the peripheral organ and the cerebellum is the center. From this center all the cerebral motor functions are controlled. It is the governor by which through the visual, auditory and other sense organs we maintain our position in space. It

Symposium entitled "Tumors of the Cerebellum," Charles K. Mills, Professor of Neurology, University of Pennsylvania.
 Edinburgh Hospital Reports, 1908.

influences and is influenced by disturbance originating in the eyes, probably in other peripheral sensory structures and is as essential in the act of binocular vision as is the cortex of the cuneus, the quadrigeminal bodies, the retina or any other part concerned in the visual act.

Waetzold's observation has a bearing in this connection. "Out of 1,000 young girls studying the piano before the age of 12 years," he says, "600 were afflicted with nervous troubles later on, while the number having affections of this kind was only 200 for those who commenced the study at a later age, and only 100 were affected among those who never touched the instrument. It would be interesting to know exactly what these nervous manifestations were and whether incoordinated movements accompanied them. It is quite conceivable that the endeavor to associate the complicated muscular movements of untrained fingers with the still more difficult task of distinguishing between tones and half-tones and combinations of chords by undeveloped neurons in the child's brain cortex, and at the same time following with eves that may not be focally alike, the notes on the staff would disrupt the delicate mechanism of the developing brain tissues, but it demonstrates, nevertheless, that it is in the intricate anatomical switchboard that all of these automatic connections are made, and it is easy to realize, if we think of physiologic processes in the terms of electricity, how readily a connection that is made of poor material, from bad heredity or poor nutrition, or that is subject to too much current from overwork or uncorrected eye-strain, may result in a shortened circuit or a burned out fuse, and the energy is then carried through another, producing a disturbance where there should be none.

It is now a recognized fact that visual anomalies, especially those involving the ocular muscles, can produce vertigo and nausea. If we add to these tinnitus, or fluttering in the ears, with a new symptom which has not been considered a direct result of deficient visual neuricity, that of ataxia, especially involving the calves of the legs, we have a group of symptoms due to abnormal conditions of the eyes which almost exactly resemble an allied group which we know to be dependent upon a definite cerebellar pathology. Are we not justified, therefore, in concluding that the cerebellum is at least an important element in correlating or coordinating the motor functions which obtain in binocular vision? At least when the so-called Ménière triad presents in practice with an obscure pathology it will be in the interest of scientific precision if the refraction and

muscular values constitute a part of each case record in every instance.

Dubois has said that rare diseases become often astonishingly frequent when a correct diagnosis has been made. I think that it will be shown that when in examining the eyes we become habituated to looking for cerebellar and auditory relationships we will be astonished to find how commonly they will be found to exist, and an understanding of the cerebellar influence in coordinating the movements of the eye muscles in the act of binocular vision may prove to be an important and hitherto neglected factor in our study of the physiology of sight.

DISCUSSION.

Dr. Holinger:—While we consider vertigo and dizziness mainly aural disturbances, yet I think Dr. Lewis has overlooked the most common form of ophthalmic origin. It is the vertigo and dizziness which we experience in looking down from a high building or from a high mountain. This form is so common that it ought almost be called normal. Dr. Huguenin, in the "Corresp. f. Schweizerärzte," gave a very good analysis of vertigo and dizziness, and has there a whole chapter on their ophthalmic origin, showing that they were not at all rare but very frequent occurrences.

DR. FRIDENBERG:—First, I would ask Dr. Lewis whether he could give any explanation of the tinnitus or fluttering in that case; whether he has any theory as to its development.

Dr. Lewis: -Simply an irritation carried back to the auditory centers.

Dr. Fridenberg:—It occurred to me in listening to the description of the case that it might be possible to explain it on the analogy of associated motion. In my own case I can produce a tinnitus of this kind associated with fluttering, voluntarily, by innervating the tensor tympani muscles. Many people can do it. Quite a number can produce this sensation by closing the eyes very tightly and squeezing the lids together. It might be produced in this case by the effort of accommodation, and as we may have associated flushing of the face or associated corrugation of the brow in the same way, the cases given here might have been purely a motor overflow.

As to vertigo, I think it ought to be borne in mind that vertigo or dizziness is not a single symptom, but that we have a long range of phenomena grouped under this term. When there is no disturbance of equilibrium and no motion of the eyes these forms depend purely on visual impression, on confusion of sight, and an instance of this is the dizziness produced by improper glasses or in looking through prisms. Then we have the form of dizziness of ocular paresis, where there is double vision, and where there is attempted motion of the paralyzed muscle, causing a disturbance of the sense of balance. Finally we have disturbance of equilibrium without dependence on sight. We have the purely rotational form, which may be caused by turning around rapidly, where the vertigo will come on even if the eyes are kept closed. Even without rotation, in perforation of the drum, the syringing of the ear may cause intense vertigo, where it is quite evident there is no visual disturbance. The nerve path has been shown very definitely in connection with the organs of equilibrium in the labyrinth and the nerve centers in the cerebellum.

As to the nystagmus, it is an automatic attempt at compensation, and if we are to understand this complex we must consider this as a reflex for the re-establishment of balance. It is an attempt to fix objects which we know to be firm in space, and when our sense of balance is disturbed there is a reflex attempt on the part of the eyes to re-establish it by fastening on to something steady in the external world as a support.

Dr. Barck:—The case reported by Dr. Lewis is rather unique, while disturbances of other kinds have been reported from time to time. I refer to the connection between the labyrinth, more especially the semicircular canals and nystagmus. Regarding this I would like to place on record an experience I met with some months ago, which is as close to a physiological experiment as it can be made.

Some months ago I saw a gentleman who had purulent otitis, not treated and neglected since childhood. He had such a nausea and dizziness that he could not walk or even sit up in bed. He found relief only in a quiet, horizontal position. He had been treated nine days by the family physician when I saw him. The fetid discharge, painful mastoid, in connection with the labyrinthine symptoms made the diagnosis of a mastoid abscess, which had invaded the semicircular canals (most probably the "horizontal one, as the nearest"), a very easy one.

The operation proved the diagnosis correct. In the outer wall of the horizontal semicircular canal there was a defect two or three lines long and about one line wide, and the area was covered by granulations. According to the advice of Friedrich, I did not scrape them out and tried not to expose the labyrinth further, but simply cleansed the granulations gently. At this stage the anesthetist mentioned that here was nystagmus. The experiment was then repeated a number of times. Whenever the granulations or the bony edge of the semicircular canal around them were touched with a probe there followed a distinct horizontal nystagmus in both eyes, but to a larger extent on the affected side.

After the operation the dizziness subsided gradually and had disappeared entirely after about two weeks. The subsequent recovery was an uneventful one.

Dr. Jos. Beck:-I was very much interested in Dr. Lewis' case, and while it was very exhaustive, some points were not mentioned or I did not hear them, and they should be mentioned in connection with the clearing up of the diagnosis. Of course, the case got well without further dizziness, which would disprove my supposition or rather diagnosis I made when he described the symptoms, namely, brain tumor or cerebellar pressure. I would like to know the pulse rate, the ophthalmoscopic examination, the temperature, in order to be sure we did not have some intercranial complication; also what therapeutic measures were employed, and whether treated by antisyphilitic remedies. The case is suggestive of pressure; such a thing as hemorrhage. I would call attention to a recent communication on labyrinthine irritation. When I first heard of them and heard Jansen describe them I thought them valuable and put them in practice at the first opportunity. A case of chronic suppuration I had operated on two different times by radical measures and was unable to cure it; always a small fistula over the semicircular canal remained and the patient always complained of dizziness when touching these granulations. Taking a bit of cotton in cold water and then touching the granulations with it developed a marked nystagmus corresponding to the canal that is exposed. It was more pronounced by hot water application. All have seen by forcing water into a perforated drum the symptoms of nystagmus. I should like to believe the dizziness in the case of Dr. Lewis was due to the ear rather than eyes.

DR. GIFFORD:—In support of Dr. Lewis' contentions I will mention a case. A man came to me complaining of recent dizziness. The attacks would come on several times a day and were very troublesome, although not serious. In trying to estimate whether the eyes had anything to do with it, I asked him particularly if the dizziness also affected him when in bed, lying down. He said it would sometimes come on after he had gone to bed. On the strength of this statement I was prepared to find there was something else wrong besides the eyes. I hardly could see how refractive or muscular defects could influence the case when the man was lying in bed with his eyes closed. I found he had one dioptre of astigmatism, and was surprised to find, on giving him correction, that the dizziness disappeared entirely.

The symptoms mentioned by Dr. Fridenberg of a tinnitus on closing the lids firmly I have attributed to the action of the stapedius muscle, and considered it an overflow stimulus from the facial. It is also interesting, as this is a question of the eye and ear, that this tinnitus is caused only by the contraction of the fibers of the orbicularis muscle, which depress the lid in particular, and not by those fibers which pull down the eyebrow and pull up the cheek. The pupillary contraction which was described first by von Graeffe, and rediscovered by myself and two or three others as the result of closing the eye forcibly, is produced by the action of these lid-fibers and not by the fibers of the orbicularis which control the outlying tissue.

Dr.. W. L. Dayton:—I would like to speak of three cases I call to mind, showing that the manifestation of vertigo may appear under different circumstances. I call to mind one, the president of a bank, but an old practitioner of medicine, who consulted me, saying he had lost consciousness on his way home, and when he came to he found himself lying against the fence and really did not know where he was. When he would work his eyes hard in the bank, or read—in other words, use his eyes considerably, he would become dizzy. I found there was an exophoria in his case of 14 to 16 degrees. This patient had never complained of vertigo while lying down. He has gone along with his duties without any trouble with prisms, and we have weakened the prisms from the 4 degree base in for each eye to 2 degrees for each eye, cutting it down one-half. He is working hard and has not complained recently. This may be due to his fear of my doing a tenotomy, as I have threatened.

Another case, a female instructor in the university, unable to lie upon her back without vertigo, also had dizzy spells, falling once on a picture on an easel and cutting her face badly. This led to an investigation of her eyes; she had an exophoria with divergence at times of O. D. After correcting her refraction and making a tenotomy she was entirely free from this vertigo and has remained so for several years.

Another case was in a female who was unable to lie upon her left side. She had a refractive error which I have kept well corrected for the past fifteen years, and in going over the eyes again I found no anomaly there, but found that while there were no appearances of middle ear trouble and the membranæ tympani were normal in appearance, that catheterization of that side of her head relieved her vertigo. It did not cure it. There were recurrences, and after each recurrence she would call me to catheterize her middle ear. There was a case where eye strain had nothing to do with it, while the other two cases undoubtedly came under that category.

Dr. Lewis (closing discussion):—Dr. Gradle was very wise in clearly defining his position before presenting his address, so that he was not likely to be understood as claiming more than the facts would warrant. I

endeavored to do the same, but evidently have not quite succeeded. I wish to demonstrate merely that a complexus of symptoms which are closely allied to those which make the Ménière group may have their origin in functional disturbances of the eyes, and that cases in which the essential triad are present, which are studied, will not have been completely analyzed until the full condition of the eyes has been determined upon and recorded. We may find that the whole subject will, from that basis, require further investigation. I will say in answer to Dr. Beck's question that the fundus was, of course, carefully explored and that there was no evidence whatever of a cerebral neoplasm.

The observation of Dr. Barck was exceedingly interesting in demonstrating that an irritation applied to the semicircular canals will produce nystagmus. It would seem to corroborate the view that Perkinje's cells are the auditory end organs and that there is a direct connection between the ear through the cerebellum, and the eyes.

REFRACTIVE MYOPIA.

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NEW YORK,

When the student of the refractive conditions of the human eye and the correction of those conditions with glasses turns to the textbooks and to the writings on refraction he finds two conditions presented in the study of myopia. The final conclusion, then, of all his study may be stated in this way-myopia is the resultant of two conditions, viz.: axial myopia and refractive myopia. pursues his studies still further he finds that the writers of all the text-books fail to consider the condition of refractive myopia. except as a pathological process, and proceed to discuss fully that of axial myopia, its cause and effect, its objective and subjective conditions, and its correction with glasses. Further, we find that Priestley Smith tells us this: "Myopia in some cases is an innocent condition, not leading to disaster of any kind, while in other cases it is a pernicious condition which leads sooner or later to serious impairment or loss of sight," and that "the duty of every oculist should be to suspect (italics mine) every myopia of a tendency to increase, until time has proved it to be stationary." This evidently refers to two existing conditions in myopia, innocent and pernicious, in which we must suspect every case until time alone has proved the myopia to be innocent, or, in other words, non-progressive.

The writer has not felt willing to accept this teaching, as it seems to him that if we have two conditions of myopia, must we wait an uncertain number of years for it to prove the condition of innocency or the condition of progression, or may we, by a reasonable and available examination, decide within a very close estimate if the case does present any indications of the innocency or the pernicious dangers of the myopic eye? If this be true, then the last proposition as advanced by Priestley Smith has no special force, as we may assure our patients with this reasonable statement, that their myopia is benign, or we can caution them of the possible dangers of a progressive myopia at the time of our examination.

In 1902 I presented a paper on this subject to the Section of Ophthalmology of the New York Academy of Medicine, entitled

"The Prognosis of Myopia," and since that time I have continued my observations on this subject, the result being that all my recent work has so far fully verified the conclusions of that paper, inasmuch as I have found a certain condition that shows the diagnosis between that of a benign and that of a pernicious myopia, which has been fully confirmed in all my private and clinical cases after several years' observation. Though my records show some cases that are on the border line, and some that show exceptions to these certain rules, vet they by no means prove that these conclusions are not correct, and that they may not be of service to the profession of ophthalmology. We may then state that I believe we do have a benign and a pernicious myopia, or, in other words, that I believe we do have a refractive and an axial myopia respectively, and that in one case we have that of a stationary and in the other case that of a progressive condition. Granting this, the diagnosis and the prognosis of these two conditions become extremely essential in the proper correction of the myopia and the further supervision of all these cases. It was on this proposition that my first paper was written on the prognosis of myopia, and since that paper was issued I have failed to find a case of myopia in my private or in my clinical work at the Post-Graduate Hospital that did not confirm these conclusions in every way.

Looking over my case-books for the last 2,000 cases of refraction I find about 11 per cent. of myopia, with and without astigmatism; in round numbers this gives us 240 cases of myopia, and we may say nearly 500 examinations. This is a sufficient number, in my estimation, to indicate some conclusions, or, in other words, to justify us in the prognosis as it relates to the innocency to the visual apparatus, or to the possibility of any serious impairment of the vision in all our cases of myopia as they present for examination and correction.

Let me refer you to a little past history in reference to this work, and as an illustration of the findings of this paper allow me to state that in 1897 I had the honor of reading a paper on "The Curvature of the Cornea in Reference to the Refractive Condition of the Eyes," in which my conclusions were based on the measurements of more than 1,000 meridians. The average of all these examinations conclusively proved that the normal radius of curvature was about 7.65 mm. (a slightly shorter radius of curvature than the average of Donders from a smaller number), and that a

^{1.} Ophthalmic Record, August, 1902.

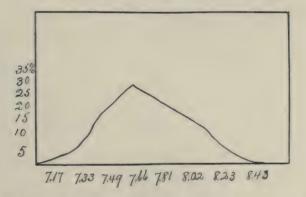
^{2.} Ophthalmic Record, June, 1907.

large majority of the cases of myopia gave a much lessened radius of curvature than the average radius mentioned above. My conclusions at that time have been fully confirmed by my subsequent examinations of the radius of the cornea in reference to the dioptric refraction.

It goes without argument that in medicine one case does not prove a theory, even though we may use one case to disprove a theory, but we may again refer to all the cases in the same paper and, taking them all together, we find one very important factthat we notice a certain relation that seems to exist between the radius of curvature and the refractive condition of the eves. I think this holds good even though we have noted cases in which we have a very short radius, yet we find the total refraction hyperopic. I have recorded two cases of hyperopia with a radius of only 6.50 mm., and have also recorded cases in which the radius was very long and yet the refraction was myopic, as I note three cases of myopia in which the radius was more than 8 mm., but is it not self-evident that these cases are simply those of axial refraction? I must conclude, then, from my own records, that we do have a positive and definite relation between the curve of the cornea and the refraction of the eve, even if the above-mentioned special cases are very strong ones to contradict a theory. This is not the burden of this paper, yet I think we may state that the above examination of a large number of measurements of the corneal curve, made in 1897 and fully confirmed by all subsequent examinations, does show a certain relationship, and that myopia, not pathologic, may be due to other causes than an elongation of the optic axis, even though Fuchs says, "It is impossible to do away with the elongation of the eyeball, that forms the basis of myopia." I see no reason why we should "do away with the elongation of the eyeball," but I do see a reason why we may have other conditions that may cause a myopia; that this condition is not pathologic, but that it is essentially due to the shortened radius of the corneal curve. both anterior and posterior, must tend to advance the principal focus of the eye, thereby producing a refractive condition called myopia, and, furthermore, that this condition has certain beneficial features not found in the ordinary acceptance of the teachings of the present day.

I trust that I may present and prove this contention within the limits of this paper. I do not intend to quote to you the many authorities on this interesting subject, as to quote from one is practically to repeat the writings of them all in the text-books at

my command. I am not fully convinced that Donders' celebrated statement, "I do not hesitate to declare that every myopic eye is a diseased eye," is, or is not, a true proposition; yet has not ophthalmology advanced since the days of that honored teaching, and may not the investigations of others have some fruit? Now we read from Landolt that "Myopia is that state of refraction of the eye in which the retina is situated behind the principal focus of the eye." That goes without saying, nor can it be contradicted in any way, but Landolt also says that myopia may be caused "by an increase in the convexity of the cornea," and he calls this "myopia of curvature;" but he also stated that this condition is rather exceptional, and on page 419 makes this statement: "Very numerous measurements of the curvature of the cornea have demonstrated that this surface, the most important of the dioptric system



of the eye (italics mine), is not more convex, but that it is often less so in myopia than in the normal eye." I fully believe that the anterior surface of the cornea must be "the most important of the dioptric system," as at this surface the entering rays of light first meet the normal obliquely, and at this point must suffer the most extreme bending or refraction as they pass through the dioptric system of the eye, and we must feel that this surface has some influence on the position of the principal focal points.

Let us for a moment examine this anterior surface in reference to its radius of curvature and study the figures as shown by the measurements of this surface, and we may also consider those of the posterior surface, as they may be a factor in the bending of the rays.

A reproduction of Tschering's tables in Physiological Optics, p. 55, "The abscissas indicate the radii of curvature of the cornea in

millimeters, the ordinates the number per hundreds of emmetropes in whom we meet the radius of curvature in question."

The above is an exact verification of my own measurements, made in 1897, of 371 emmetropic meridians, and may be compared with the chart of my own myopic cases in which we have the highest percentage of cases showing a radius of about 7.50 mm., decidedly less than the normal radius.

In presenting to you the measurements of another, it is for the force of illustration, but for my own measurements of this anterior surface I would refer you to my former paper in the *Ophthalmic Record*, June, 1897; the above chart, from Tschering's Physiological Optics, p. 55, is the same as my own figures previously published.

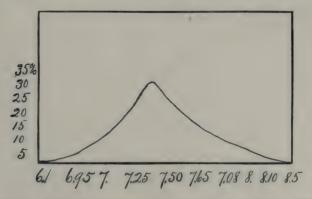
In these measurements of the emmetropic eye we find that the largest number, or 30 per cent., shows a radius of curvature of 7.66 mm., which is practically the same as my records where I have placed the highest number at 7.65 mm. and have accepted this radius as that of the normal. This may be arbitrary, but, from my past experience, it seems to me to be the term that will express the usual findings and from which we may be guided in our diagnosis. In my myopic cases I find that I have more than 30 per cent., in fact nearly 50 per cent., that show a curve of less than 7.5 mm., and that a further examination of my records shows that when the radius is longer than 7.65 mm. we have only one in ten cases myopic, and that when the radius is shorter than 7.65 mm. we have one in three myopic. I now present a chart of my own myopic cases for comparison with the chart previously given, which speaks for itself.

My own measurements of the curvature of the cornea in all my myopic cases. The abscissas indicate the radius of curvature of the cornea in millimeters, the ordinates the number per hundreds in my myopic cases. This chart shows fully that more than threefourths of the cases of myopia have the shorter radius.

I think it may be granted that an eye with the curve of the cornea showing a radius of about 7.65 mm., with the retina situated at the principal focal point, will represent the ideal or emmetropic eye, and, if so, is it not reasonable to say that if the curve of this surface, said to be "the most important part of the dioptric system," is much less than 7.65 mm., it must advance the position of this principal focal point and in this way make the total refraction of an eye myopic? Still further, if we may say that an elongation of the optic axis of 1 mm. will produce a

myopia of three dioptres, then an increased curve of the cornea of less than 1 mm. may advance the principal focal point sufficiently to produce the same degree of myopia (Hartridge, p. 130).

While I have claimed that the anterior surface of the cornea does indicate the refraction in many cases (Ophthalmic Record, June, 1897), I also believe that the posterior surface of the cornea may also act as a refracting surface, and may be one of the factors that completes the total refraction. In Tschering's measurements, p. 127, we may find a demonstration of this in his investigations of astigmatism "against the rule." Here we find that the posterior surface of the cornea may present an astigmatic curve, and that the anterior and posterior surfaces are by no means parallel, as we find that the radius of the posterior surface is far less than that of the anterior surface. His example gives the anterior surface at 7.98 mm. and the posterior surface at 6.22 mm., and may we not



assume that if this posterior curve is equal to a minus refraction of 4.73 D. it may show a still smaller curve? And if we associate with this the shorter curve of the anterior surface, which we can so easily measure, we may be justified in the contention that refractive myopia is due to the curve of the cornea and is not due to the elongation of the optic axis.

Allow me to pursue still further this contention of the influence of the corneal radius on the refraction. It is well known that we ascribe all the astigmatism of the eye to the curve of the anterior surface of the cornea, and if "a difference of 1 mm. between the meridians of greatest and least curvature of the cornea will produce an astigmatism of six dioptres" (Modern Ophthalmology. p. 718), then we may reasonably state that in a case of simple myopic astigmatism the myopic element must be caused by the curve of the cornea, and if so, may not this lessened curve, being in both mer-

idians of the cornea, produce a simple myopia? This condition is excellently well illustrated in all cases of mixed astigmatism, according to my examinations, as, if you will carefully measure the corneal curve you will find that the horizontal meridian will show a long radius, more than 8 mm., and that the vertical meridian will show a short radius, less than 7.65 mm., the myopic meridian. I have proved this in many cases, and yet we have the statement that myopia is not due to the corneal curve when there is no evidence of any pathological condition. Before proceeding further, let me present a case in my private work that may more fully illustrate this subject:

Case 1816.—N. T., boy, age 7, examined March, 1896. Can not see well at school. Under atropin, v. = 20/20 with minus 1.50 D. Father myopic, no record of radius; 1898, 20/20 with minus 2 D.; 1900, my. 2.50 D., radius 7.65 mm.; 1902, my. 4 D., with am.; 1903, my. 5 D., radius 7.4 mm.; 1906, my. 6 D., radius 7.15 mm. Ophthalmoscope, same myopia and no staphyloma or conus, Is now 18 years old.

I do not know if a similar case has been reported, but a glance at this short history would seem to convince the most skeptical that the curvature of the cornea must have had some influence on the refraction of the rays of light as they passed through the dioptric apparatus so to change the refractive condition, particularly so in this case, when there was no evidence of conical cornea or of hydrops. Is it then not reasonable to suppose that the increase in the refraction was due to a slow and gradual change in the curvature of the cornea, while an examination of the fundus showed no evidence of the slightest conus or other evidences of an ectasia at the posterior part of the eyeball? I have recorded the curve of all my cases of refraction, and the measurements on which this paper is based are from the last 2,000 cases in my private work, and of which we find about 12 per cent. myopic.

We may now ask the question, What is refractive myopia? What is the method of diagnosis? What is the prognosis, and what is the best correction? Refractive myopia, according to my investigations, is that condition of the eye in which the anteroposterior diameter of the eye may be normal, but in which the curvature of the cornea is such that its radius is much less than the normal, that is to say, less than 7.65 mm, which so refracts the entering rays of light that the principal focal point is brought nearer to the nodal point, and consequently the retina is "behind the principal focus of the eye."

The Method of Its Diagnosis.—If we will refer to my paper in the Ophthalmic Record, August, 1902, we will find certain tables illustrating this subject, and as my second series shows the same result I will not repeat them. In these tables we find only twenty-three in which the radius is longer than 7.65 mm. These must have been axial myopia. Then we find thirty-one in which the radius was about the normal, probably axial; and lastly we find sixty, or more than 50 per cent., in which the radius was less than 7.65 mm. These I would class as refractive myopes, and it is to be noted that they presented no evidence of conical cornea or other pathological condition in the anterior portion of the eve.

Now we may ask how were all these measurements made and the conclusions reached? The answer is simple, as I kept careful records of all my examinations of the anterior surface of the corrnea in the two principal meridians, as shown on the arc of the ophthalmometer of Javal. The estimation of astigmatism by this excellent instrument of Javal is based on the radius of curvature of the anterior surface of the cornea, and it is hardly necessary for me to inform this society of the method of examination except to state that we can readily read the radius of curvature in millimeters from the small scale on the arc of the ophthalmometer.

The Prognosis (the special feature of this paper).—This is always good in refractive myopia. I have watched my cases of myopia in reference to the curvature of the cornea for the past ten years, and to-day I feel that I can state positively that I have not noticed any increase in the myopic condition when the radius of curvature has been less than 7.65 mm. The same observations apply to my cases of myopia in my clinical work at the New York Post-Graduate Hospital, where I have followed the same method of examination. Furthermore, as a corollary to that, I may state that all my cases of progressive myopia have always shown a much longer radius of curvature. If all this is conceded, we must consider that refractive myopia, as I have shown it, is a benign fixed condition, to which we may find exceptions, but one that may rob the term myopia of many of its so-called dangers.

Treatment.—It has been my experience in the past few years, when we have a case of refractive myopia, according to the diagnosis advanced in this paper, that we should order the full correction of the myopia and of the astigmatism as found under the complete influence of a cycloplegic, that is to say, the use of atropin. That these must be the weakest that will give the best acuity of vision testing them first with the trial glasses over each eye sepa-

rately, with which we find the best vision for each individual, and after this monocular test has been made we may still find that the refractive power of the glasses may be reduced by the test with binocular vision. We may then order a glass that will not place any strain on the accommodation. Under this method of examination and correction it has been my experience that very few will ever need a change in their glasses, even when the age of presbyopia has somewhat advanced.

Statistics.—Referring to my former paper on this subject, I find that in my first series of 1,000 cases of refraction we have 114 of myopia; about 11 per cent. of this number we have where the radius of curvature was more than 7.65 mm., with 31 where the radius was about 7.65 mm., and 60 where the radius was less than 7.65 mm. Applying the same examination to my last series of cases on my case-books collected since the last series was published, I find records of 139 cases of myopia and myopic astigmatism, of which we have only 18 where the radius was more than 7.65 mm.. with 26 where the radius was about 7.65 mm. normal, and 95, a very large per cent., where the curve of the cornea shows a radius of less than 7.65 mm., and with one case which gave a radius of only 6.1 mm. This case showed no evidence of any pathological condition whatever, such as conical cornea, etc. Again separating this series, we find 46 cases of simple myopia with the smaller radius, and only 10 with a radius longer than 7.65 mm. It is to be understood that these statistics represent the radical measurements of fully 556 meridians, which gives us a sufficiently large number to establish a working theory. It thus appears that the majority of myopes do have this lessened curvature, and, furthermore, that Donders' statement, "in highly myopic individuals a long radius of the cornea is in fact the rule," is not borne out by these figures of my examination and measurements, and, consequently, I must question the statement that "myopia usually depends on the elongation and hypermetropia on the shortening of the axis of vision" (Donders). Now it is to be noted, as shown in my records, that some of the cases presented a very long radius of curvature, one as high as 8.5 mm.; but these are exceptions that simply indicate that the myopia must be due to an "elongation of the axis of vision."

It is in these cases of a long radius of curvature only that I have noted some evidence of a pathological condition at the posterior part of the eyeball, and I would further emphasize this by the statement that in all my cases of pernicious myopia I found a

long radius of curvature, and that in all my cases of stationary or benign myopia I found that the radius was shorter than 7.65 mm., or what I have considered as refractive myopia. It is in the light of these past examinations that I have been forced to my conclusions, and that I have come to doubt the assertions, "the existence of myopia of curvature is not yet demonstrated" (Tschering), or that the "great majority is due to elongation" (de Schweinitz), or that "it is impossible to do away with the elongation of the eyeball that forms the basis of mvopia" (Fuchs). It may be presumptuous for me to come before this society and offer to you these statistics, when they seem to controvert the words of the eminent men whom I have just quoted, as my figures do not bear out nor follow their writings; but I have no apologies to offer; I only present these examinations and my conclusions as those of only one individual working in the science of ophthalmology, trusting that some of you may feel inclined to repeat these examinations in your own private work and that in some way they may be verified.

It will be useless to burden this paper with a large number of my recorded cases of myopia, but a few present some very interesting notes as regards the radius of curvature, and also illustrate the theory of this paper. In Case 3945, R. E., my. and am. minus 6 minus 3; axis 180, radius vert. 7.3 mm., hor. 6.9 mm.; L. E. hv. and ah. plus 1 plus 1.50, axis 100, radius 7.9 mm. This case shows a shortening of the radius in the right eve, the myopic one. Case 1644, my. 16 D., radius 7.3 mm., no increase in 12 years. Case 917 ahm. shows an interesting condition of 1 D. of myopia, in the vertical meridian, and 2 D. of hyperopia in the horizontal meridian, and we note the radius as vert. 7.55 mm., hor. 8.25 mm. Case 928, 1890, minus .25; axis 180; 1904, minus 2.75 D. V. equals 20/15. Radius 7.8 mm., commencing conus. Case 2406, mv. 16 D. V. equals 20/200 with correction, radius 8.5 mm., extensive staphyloma and disseminated chorioiditis. Decidedly pernicious. Case 4811, age 69, my. 11 D. V. equals 20/50. Radius 6.75 mm., no staphyloma, decidedly benign. Case 2730, in 1900, my. 5 D.; 1902, my. 8 D.; in 1907, my. 11 D. This shows the changes in the left eye. In the right eye we have my. 5 D. and no increase in the myopia. The radius, L. E., equals 7.65 mm.; in the R. E., 7.15 mm. This seems to show a benign and pernicious myopia in the same individual. Case 1408, in 1893, my. 2.50 D. V. equals 20/15; in 1908, after 15 years, myopia and vision the Radius of curvature, 7.1 mm.; is not this benign? Case same. Master R., 1902, my. 1.50 minus 1; axis 180. V. equals final.

20/15; in six years we have my. 4 D. 1; axis 180; V. equals 20/15. Radius of curvature 7.75 mm. Is not this pernicious?

Complications.—It may be interesting in this connection to digress sufficiently from my subject to note, in passing, some notes and complications recorded in the last series of cases. I have notes of fifteen cases under observation for several years showing no increase in the myopia, all these showing the lessened curve, and also six cases under observation the same time, showing an increase in the myopia, all with the increased curve or the flat cornea. As regards the motility, we have an equal number showing esophoria and exophoria: in eleven I find central or macular chorioiditis noted, and changes in the lens five times. Amblyopia, nystagmus, hemorrhage in retina, opacity of the cornea, disseminated chorioiditis and divergent strabismus once each. In many of these cases showing a pathological condition I was unable to trace any connection with the myopia, notably so in the cases of central or macular chorioiditis which Fuchs says may be due to senile changes. I have noticed this condition in my senile cases showing the same changes in each eye.

In the further consideration of this subject, it seems to me, we have a very important question to answer in reference to the operation of the removal of the lens in high myopia. I have been familiar with the reports of these operations, and if my memory serves me I have not seen any detailed reports of the failures following this procedure; yet I regret to say that in my clinical work I have seen some very bad failures from this operation. Now I have never performed the operation for the removal of the lens, and for the same reasons that were so well expressed by Edward Jackson in his discussion of Lambert's paper before the American Ophthalmological Society, 1907, in which he records the necessity of the diagnosis of refractive myopia from that of axial, as this has great influence on the final refractive condition in the cases; and personally because I consider it too dangerous to perform this operation on a case of axial myopia, while in the cases of refractive myopia a full and correct estimation of the static refraction will carry them through life with reasonable comfort. Nor can I feel that several successful cases, such as Lambert reports, can overbalance one failure which results in the destruction of an eye that was more or less useful.

In concluding this paper, we may well ask, Have we a refractive myopia, and, if so, what are the essential points in the diagnosis, and what are the advantages of all this to the profession?

From a careful study of the practical parts of this paper, I feel convinced that we do have a refractive myopia, that its essential point in the diagnosis rests along in the corneal curve, which must be much smaller in the radius of curvature of the anterior surface in each meridian, and that this refraction may be increased by the curve of the posterior surface. Tschering has well shown that the radius of curvature of the posterior surface is very much less than that of the anterior surface. These two surfaces must have a decided bending of the rays of light as they enter and pass the dioptric media. All this must advance the posterior focal point to a position in front of the retina, which may be corrected by a concave glass that will afford a permanent state of vision, and consequently we have no tendency to progression with all its attendant dangers. Now in selecting the radius of 7.65 mm, as that of the normal, it is an arbitrary figure, which you may prefer to change to that of Donders', as 7.8 mm., but this figure was the result of an average of more than 1,000 measurements of the meridians of the cornea, and it has fully illustrated and confirms all my conclusions. Furthermore, it seems to me the advantages of this diagnosis are decidedly important. We are all familiar with the dangers of a pernicious myopia, the occurrence of progression to an extreme degree, the possibility of a detachment of the retina, the formation of an extensive posterior staphyloma with its attendant sclerochorioiditis, the diminished vision and the inability to use the eyes. All these conditions are truly deplorable in some of our advanced cases, while, per contra, if we have a myopia of curvature we find that it seldom, if ever, progresses, it does not tend to the formation of the posterior crescent or ecstasia, and even an intercurrent chorioiditis does not tend to increase, while the vision remains stationary and they have excellent ability to use the eves with the possible absence of presbyopia as age advances. These are the pictures of pernicious and of benign myopia as I have met this condition, as I have watched them and as I have studied them in my private and in my clinical work. I am convinced that they are correct, so much so that to-day, given a case of refractive mvopia according to the diagnosis as stated in the foregoing pages, I can affirm with full confidence that the myopia will never increase to any serious extent and that, after suitable full correction, the eves may be used for reasonable study or occupation. Many of you have had the question asked in your consultation rooms by an anxious parent whose child is about to enter on a college course, Can this boy or girl go on with his or her studies and will the

near-sightedness increase? To answer such a question seems to me to be all-important. Shall we say to that enquirer, We must wait for two or three years to note if the myopia will progress, or shall we say that, in our opinion, this case of myopia is benign, it will not tend to increase, and this child may continue its studies at school after proper correction of the myopia? Certainly, as far as my own experience goes, the last proposition has never failed and I have yet to see the true case of refractive myopia increase to any appreciable extent.

DISCUSSION.

Dr. Jackson:—Dr. Valk has brought before us much valuable material. I must confess that I am not well prepared to discuss the paper at this time. I have used the term "myopia of curvature" rather than "refractive myopia" commonly, and the abstract as given in our program did not throw much light on what he would say, so I have no statistics on the duestion. I have, though, a very clear recollection of certain things observed in practice. There are a certain number of cases of myopia in which the cornea shows greater than the usual curvature. But the number of these cases is rather small, although the excessive curvature is quite striking in some of them. As to the progressiveness of "refractive myopia," in my experience comparatively few cases of myopia are progressive. I should say not more than 5 per cent. show any progress after I first see them. That 5 per cent, is almost wholly in young people between the ages of 10 and 15 years. I have found two cases among the few in which I have advised removal of the crystalline lens, in which the corneal curvatures were very much below the average; so much so in one of them that I calculated there must have been very little increase in the length of the axis. So as far as I can recall I would be disposed to think that in these cases the myopia started as a myopia of curvature, and the patient, using such an eye for near work and under unfavorable conditions, was liable to add an axial myopia to that of curvature. I am not disposed to draw a sharp line between different classes of myopia, regarding this myopia as innocent and that progressive or pernicious. We have cases of scarlet fever where it is possible to think the child has the disease only because it is in the neighborhood, and others that are fatal in a few hours. So in myopia I have never recognized distinct separated classes of cases. They seem to be the extremes of the same group rather than separate groups.

DB. Howe:—If I understand the argument, it is that the diagnosis rests with the ophthalmometer. We must remember that we really measure a very small portion of the very center of the cornea. Then we must remember also that the curvature of the edge of the cornea is almost always different. It is not a matter of theory, but can be demonstrated, that many cases which we have considered as slight myopia are but an excessive action of the ciliary muscle.

Dr. Henry Gradle, Chicago:—Dr. Valk's previous publication on this subject seemed to me of such interest that I began to take regular ophthalmometer measurements in myopia, but, as I have never viewed my records or analyzed them, I can only speak of impressions and not base myself on statistics.

It seems to me that Dr. Valk has identified too much the two terms, non-progressive myopia and innocent myopia. There is, strictly speaking, scarcely an instance of absolutely stationary myopia. Myopes are very rarely born as such, but grow short-sighted in childhood. Even very low

degrees of myopia are apt to increase slightly until growth is completed. The question whether myopia in a given case is innocent or dangerous is, hence, not quite identical with the question whether or not refraction is still changing. Of course, the history of rapid change or of continued increase after the twentieth year of life suggests the more serious form of myopia. In general, we can say that a myopia of less than 4 D. after the age of puberty is, as a rule, innocent and unlikely to change, while myopia

over 7 to 8 D. is exceedingly menacing.

In the individual instance, especially in the uncertain class, between 4 and 7 D., we can judge of the prognosis by certain criteria. First, the previous rate of growth of the myopia as far as it can be learned; second, the vision after full correction. In the more favorable instance and those least likely to progress we get normal or nearly normal sight, while in the dangerous cases no glasses can raise the vision to the normal standard. In the third place the condition of the fundus is almost definitely decisive as to the future of the eye. A strictly normal nerve head without atrophy of the surrounding chorioid proves that this eye is healthy and not in danger of changing materially. A sharply bordered crescentic conus indicates lengthening of the eyeball, which may perhaps continue, while an irregular extensive patch of chorioidal atrophy means that the yielding of the posterior pole has probably not ceased.

The question now arises, Is the innocent form of myopia due to excessive refraction and does the more serious type depend on axial elongation? My measurements agree with those of Dr. Valk in finding in the more serious or decidedly more progressive types a normal or at least never a short radius of corneal curvature. On the other hand, I have sometimes observed a very short radius in medium degrees of myopia which were evidently benign and relatively stationary, according to all the other criteria. But after all, as near as I can recall, a radius sufficiently short to account for the myopia was found only in a small proportion of instances. Yet these more benign cases may be due to increased refraction even though the corneal curvature is not abnormal. A very slight change in the curvature of the lens surfaces, or the increase of refractive index from the cortex to the center of the lens or in the position of the lens would account for a myopic increase of refraction.

DR. VALK (closing):-First I would say that I hope my paper may stimulate Dr. Jackson to find a line he can draw between pernicious and progressive myopia. I simply watch these cases, and I have failed to see a progressive case that showed this short radius of curvature. I presented this paper in the hope that some of you might follow out the investigations, as Dr. Gradle has done, and learn whether the cornea does show this short curve. That is the very point. In my cases where I did find the shortened radius, I never found any evidence of posterior chorioiditis, etc.

CAUSES AND TREATMENT OF LACRIMAL DISEASES.

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Dacryocystitis, or inflammation of the lacrimal sac, is one of the most difficult diseases to obtain a permanent cure that the oculist is called upon to treat. The mere fact that the vast majority of cases are allowed to progress without attention until an acute abscess or total occlusion reminds the patient that something is radically wrong and should receive attention is proof of the above statement. A cure is expected in a few days. When it is explained that probably treatment will extend over a long period and must not only be persistent but may also be painful, the unhappy patient seeks other advice, and often changes to another physician, especially if a cure is promised in a short time, as is often the case by charlatans or advertising doctors.

The lacrimal sac is one of the four divisions or parts of the lacrimal apparatus. The lacrimal gland, with its two divisions, superior and inferior, which empty their secretions into the eye at the upper and external fornix, is the first division.

The sewage or drainage of the secretions supplied by the first or glandular system of the eye begins with the punctum lacrymalia, or entrance of the lacrimal ducts, one in either lid, extending inward and joining together, forming the common duct which enters the lacrimal sac.

The third part, the lacrimal sac, lies in the inner and lower part of the orbit in a groove called the lacrimal sulcus, which presents a smooth, concave, longitudinal surface. The free margin unites with the nasal process of the superior maxillary bone which completes the lacrimal groove, the upper part of which lodges the sac and the lower the nasal duct.

The tensor tarsi muscle and the internal palpebral ligament pass external to the sac. The sac proper is about twelve to fifteen millimeters in length and five to six in width, unless dilated from long continued distention. The upper extremity of this sac is oval and dilated larger than it is below, gradually becoming smaller until it enters the nasal duct. Here is the smallest caliber of the duct. It gradually dilates as it passes from the entrance of the lacrimal canal and empties into the nose. The sac is covered externally by a fibrous expansion derived from the tendo oculi.

The fourth division of the apparatus is the nasal duct, which is narrowed down to a caliber of about two to three millimeters. It extends from the lower part of the lacrimal sac to the inferior meatus of the nose, where it terminates by an expanded orifice, or, as Gray says, "It is provided with an imperfect valve formed by the mucous membrane."

The entire inner surface of this canal and sac is lined with a columnar epithelium similar to that of the nose. The point of constriction at the entrance of the duct is the location where we have the most trouble with stenosis.

The causes of diseased conditions of these structures are manifold. Discharges from infected conjunctivæ and external infection entering through either extremity of the canal from eye or nose are frequent causes, those from the nose being in the vast majority. Occlusions of either end, from malformation or malposition, or pressure on the punctum or on the canal at its nasal opening. It is especially due to pressure made by some growth or hypertrophic tissue in the nose. As has often been said, investigate the nasal cavities thoroughly before making a diagnosis.

All writers agree that the nose is the chief offender in the causation of this disease. The nose, therefore, should be very carefully inspected and, if possible, the offending focus of infection or pressure from hypertrophied tissue or growth should be removed. Malposition of duct or of the turbinal, along with diseased conditions, often occlude, and if it is removed and the exit made free the mucocele or inflammation of the sac can then be treated by mild antiseptics. Conservative treatment is always to be adopted and persisted in until a cure is obtained or until we are certain of its inability to effect a cure, unless circumstances as hereafter mentioned alter the case.

The old-fashioned slitting of the canaliculi at first treatment, followed by the introduction of probes, is only mentioned to be condemned, especially the very large probes such as were advocated a few years ago. The No. 5 Bowman is the largest necessary. The probes, if necessary to be used, should be introduced through the canaliculus after it has been stretched or dilated with a graduated dilator until the largest probe necessary can be introduced into the sac and then forced through the duct into the nose. A 2 per cent. solution of cocain injected into the sac and some dropped into the conjunctival cul-de-sac will oftentimes render this procedure nearly painless. The tract should be thoroughly cleansed by injecting with a lacrimal syringe some mild antiseptic solution, care being taken not to use great force, and we should be certain the blunt needle

is introduced into the sac, otherwise great damage can be produced by injecting the solution into the tissues, especially if argyrol or some silver salt be used. I have seen argyrosis produced by injecting argyrol, which remained permanent, nearly wholly surrounding the eye, causing very great discomfort to both patient and physician.

If necessary to slit the canaliculus, the lower one is usually chosen, unless scars from some injury or malformation are present. If so, then use the upper one. Small probes, even a No. 1, carefully inserted will often open the canal so that irrigation will complete the cure by reducing the inflamed and thickened tissues.

Thorough cleansing and drainage must be the object sought in all cases. While the above treatment carefully carried out over a period of weeks is often successful, we have so many failures that a newer, better and quicker method has been sought. This, I believe, in properly selected cases has been found in the extirpation of the sac.

I wish to give due credit to Professor Meller of Fuch's clinic, Vienna, for the method of removing the sac. Therefore, I have used freely my notes that I took when under his tutilage in Vienna. His new work has the operation fully and completely described, but this paper was written before it came from the press.

A few laws governing this operation should be rigidly observed or failure will be the result as in former treatment.

First.—Never operate on an acute dacryocystitis.

Second.—Never operate until milder and more simple means have failed.

Third.—Never operate during active syphilitic invasion.

Again, we have many cases that come under the following lists which can not have an extended period of treatment. I make it a rule to operate on the following classes of patients:

First.—Cataract patients who come from a distance and have neither the means nor opportunity for taking a long extended course of treatment before operation.

Second.—Nervous or hysterical patients who are unable to bear the passage of probes or even the use of the syringe. (One man I now recall fainted and was so sick he had to be removed to his home in an ambulance every time either a probe or a syringe was introduced.)

Third.—Children who are practically unmanageable, causing not only an endless amount of bother but also a liability of injury to themselves by resistance. Fourth.—Long persistent cases that have not responded to careful treatment.

Fifth.—Traveling or transient patients who are compelled to be under a new physician's care almost constantly, thus running the risk of neglect and greatly increasing the expense.

Sixth.—Persons living in rural districts and unable to be away from home for extended periods and financially unable to return to the oculist.

Seventh.—Where ulcer of cornea is present and does not respond to treatment.

Eighth.—Where there are malignant growths in the sac.

Ninth.—When one eye has been lost and a constant discharge from the sac endangers the remaining eye.

The removal or extirpation of the sac, many operators say, is one of the most difficult operations that the oculist is called upon to perform and, therefore, necessitates an exact knowledge of the anatomy, as well as absolute care that all the field is rendered as near aseptic as possible. Not only the external surfaces should be rendered clean, but also the contents of the sac evacuated by injecting antiseptic solutions, thereby leaving as little cause for infection as possible.

In Fuch's clinic Dr. Meller makes it a rule never to operate under a general anesthetic, except in very small children and neurasthenics who will not bear operating under local anesthesia. During my stay with him I saw him operate twenty to twenty-five cases all under local anesthesia. The hemorrhage is so much greater under the general anesthetic that he advises against its use in every possible case. If the injection of the anesthetic is done as directed, closely following every detail, there is no probability of the patient suffering.

The anesthetic should be begun by dropping a few drops of a 4 per cent. solution of cocain into the conjunctival sac, then the field of operation and conjunctival surface should be thoroughly cleansed. Next dilate the canaliculus with a graduated probe large enough to allow the lacrimal needle to be inserted easily. A 4 per cent. solution of cocain with one-tenth its amount of adnephrin or adrenalin should be injected into the sac. The patient should be lying as nearly on his face as possible so that this solution will not flow down the throat. After the sac has been anesthetized in this manner it should be followed by syringing with a mild solution of bichlorid or permanganate. A 1 per cent. solution of cocain with the same amount of adnephrin as the above solution should then

be injected over and beneath the sac. The needle should be inserted through the skin beneath the tarsal ligament and about four to six minims of the solution injected. The needle now should be inserted above the tarsal ligament down until it strikes the bone, then turned slightly laterally and the same amount of the solution injected slowly. If the needle has penetrated the sac the solution will flow from the canaliculi. If such is the case the needle should be withdrawn and inserted in another direction so that the solution will be placed beneath the sac. The third injection should be immediately over the entrance of the nasal duct and should be injected deeply, as in the second injection. If this technic has been followed the field will be thoroughly anesthetized as well as rendered nearly bloodless.

Have the patient close the eye and keep it closed during the opertion, that the tissues may not be drawn tense. Locate the crista and make the incision through the skin about one millimeter internal to its crest. This incision may vary in length, according to the depth required to reach the sac or according to the skill of the operator. A skillful operator can do the work through a very small opening. Do not stretch the lid. The incision should be made slightly curved, from two to three millimeters above the level of the internal canthus, downward and outward about twelve to fifteen millimeters, following the curve of the crista. Do this with a sharp, thin knife. After the skin is incised, dissect it back three or four millimeters, then control the hemorrhage that is present. Often this bleeding from the veins of the skin will be the only hemorrhage you will encounter.

The superficial fascia will then be in view. Before incising this place your retractors in the wound so they will hold the skin completely out of your way. The external fascia should then be divided with the aid of the scissors and retracted the same as the skin. The same will be true of the orbicularis muscle. Do not use the knife to dissect the muscle back. The point of the scissors or a small, blunt dissector is much to be preferred and not likely to cause so much hemorrhage. You will then encounter the deep fascia which covers the lacrimal sac. This deep fascia is an extension of the periosteum of the surrounding bones and is quite dense, hard and of an ivory-like hue.

After again locating the crista, either with the aid of the finger or scissors, slit the deep fascia about a millimeter behind the lateral crest, care being taken that the scissors do not enter the sac at the same time you are slitting the deep fascia. Through this opening you will see the bluish colored sac, and by careful dissection

you will be able to loosen it both internally and externally along with the periosteum. When the dissection is completed, the sac loosened at both ends, seize it with strong forceps and cut the ligamentous attachment at the upper angle. You may encounter some hemorrhage at this point, but you have the sac completely in view and will be able to control the bleeding by pressure. When the sac is loosened from above, with the scissors dissect down to the entrance of the duct and excise as low as possible; then, after the injection of a little more cocain, the canal should be thoroughly curetted, leaving no mucus surface remaining in the nasal duct. This will insure closure of the duct in its entire length. Now inspect your surface to make sure that all the sac has been removed. If any part of it remains there will be a fistula resulting and it will necessitate another operation to remove the remaining membrane, and I assure you this will be more difficult than the original operation.

Some operators advise slitting the canaliculi and destroying the mucous membrane of the canals to avoid a blind sac in this region. I have had no trouble in this line and shall not go to this extremity unless I find more reasons than I now have. From my experience there has been no trouble at all with the remaining closed lacrimal ducts.

After removing the sac the incision is closed by three deep and four or five superficial sutures. If carefully coapted no scar will be noticed. A small compact of gauze is now placed over the wound and held in place by a tight bandage. This last procedure is very important, since there must be a complete control of hemorrhage in the cavity. Very firm pressure may be uncomfortable to the patient but must be insisted on to obtain the best results. As a rule, if your technic in asepsis has been without fault, the wound heals by first intention and the stitches can be removed in four or five days. The resulting scar, if no infection has taken place, will be scarcely noticeable after a few days. I wish to insist again never to operate in acute cases. If pus has formed, drain as you would an abscess and treat until the acute symptoms are relieved, then operate as above.

The epiphora will probably remain to some extent for six to eight weeks. After this the patient will probably have no evidence of excessive amount of lacrimation. From the best statistics that I can obtain, and from my own cases, about 6 to 8 per cent. of sac removals will continue to have excessive lacrimation. It is to be understood that any conjunctivitis or other irritation about the eye must be removed. Also all strain, such as errors of refraction,

etc., will have to be corrected. If the epiphora still remains after several weeks then the removal of the lower lacrimal gland is a justifiable procedure; I should say never do this when you operate on the sac, since the per cent. of cases where it is necessary is so very low.

The method of operating on the lower or inferior lacrimal gland is simple and easily done—a double roll of the lid; that is, inverting the lid as we do to inspect the conjunctiva, then grasp the inverted lid with a broad, smooth thumb forcep and make a second roll—that is, turn the thumb forceps up until the lid is rolled the second time on itself. This should be held by an assistant. Then incise the conjunctiva under local anesthesia and dissect it up, exposing the gland. The fascia and muscles need not be disturbed After the gland is removed the conjunctival in this operation. wound is closed with two or three catgut sutures. The removal of this section of the gland will, as a rule, cause atrophy of the upper gland and the epiphora will then cease. In case of failure to control the epiphora, which sometimes happens, the entire gland will have to be removed. This is a more serious operation, since the orbital tissues are exposed and operated upon by opening from the external surface through the tissues until the gland is exposed. The technic of this operation will not be taken up in this paper.

The question will naturally be asked, "what becomes of the tears when the sac is removed"? In answer, "The sac removal has an indirect action on the secretion of the lacrimal gland which causes the flow to cease." Then the query will come, "Will not the eye be too dry without this flow of tears"? No, this is not my experience nor the experience of those who have operated a great many times. The other glands of the eye furnish abundant lubrication for the required moisture of the eye and no inconvenience from the lack of tears is noticed.

DISCUSSION.

Dr. Barck:—I would like to make a few remarks only regarding technic. The description given in most of the text-books, and as just now outlined, is that, after the lachrymal sac has been laid bare, it is separated from the surrounding tissue and finally cut off from the nasal duct. The greatest difficulty is met with in the upper portion of the lacrimal sac; sometimes it is very difficult to get it out completely and not leave portions behind. Then it is here where we most frequently get the hemorrhage. We are working in the dark and a severe and uncontrollable hemorrhage retards progress. Since some years I have proceeded in the opposite direction. After the sac has been laid bare I detach it from the periostium of the lacrimal bone, and then get around it completely with a curved hook and detach down the nasal duct as far as possible and then

cut it off. Then take a good hold with a strong forceps and draw the sac forcibly down and out. The upper part is thus entirely exposed to view, and in consequence of the strong pressure and pulling I have never since had hemorrhage from that part. I can operate thus in half the time or less than I did previously. I have done about a dozen operations in this manner and I can recommend this procedure highly to you all.

THE TEACHING OF OCULAR PATHOLOGY TO GRADUATES AND UNDERGRADUATES IN MEDICINE.

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It seems superfluous to urge before an educated audience like this the claims of ocular pathology as an essential study in the curriculum of the undergraduate medical student. Still less uncalled for would at first appear a plea for teaching the same subject to graduates in medicine. So far as it concerns the undergraduate student, the study of pathology is the culmination of all his other studies, whether they be surgical or medical, or both. If we except clinical observation—and even these can not be divorced from, and ought to always be made with a side glance at the pathological aspects of a case—there is no other subject that so aptly combines, illustrates and applies all his previous investigations of human and comparative medicine. Without at least a fair knowledge of pathology—anatomical, histological, surgical and medical—all other knowledge of our profession is as "sounding brass and tinkling cymbal."

If this contention be correct, one may at once pass to the essence of this paper, and ask *how* may the *undergraduate* student make a practical acquaintance with this important and rather extensive subject without an undue expenditure of his time and energy?

At the outset, one must bear in mind the comparatively recent extension and multiplication in America of the courses that comprise the medical student's curriculum. When it was possible to obtain a medical degree in three years, the burden of teaching was at least fitted to the shoulders of both teacher and student. pressure on the time and brain of each was at least no greater than it now is, for the simple reason that comparatively few subjects were taught. In recent years, conditions have changed. When, for example, the university in which I have the honor to teach, decided not only to adopt a five-year medical curriculum, but to relegate to the matriculation, examination, several subjects previously taught in the medical school, one of the principal advantages that were expected from the change was the additional time that could be given to minor subjects, such as special pathology. This expectation has been realized, and, if I correctly read the educational signs of the times, the lengthening of the medical

curriculum means not so much additional matter to courses already in existence as specialized teaching in divided and subdivided subjects co-related to them.

Until recently a class in ophthalmology had (with few exceptions) to be content with, first, such rare and generally vague references to the morbid histology and pathogenesis of eye diseases as the time allotted to the subject permitted; second, with a few facts and theories of ocular pathology as they picked up in the laboratory, or in lectures on general pathology. Finally, they absorbed a few tid-bits of information secured by their own reading of text-books.

From my own experience as a teacher, and from conversations with fellow-teachers, I feel certain that what we now regard as neglect of this subject was not due so much to a lack of appreciation of its value and importance, but was the direct outcome—first, of insufficient time, and secondarily, of defective equipment.

Now, with the addition of a year or two years to the collegiate course it is possible for the student to devote some time to the special study of ocular pathology.

In reply to the question as to how this may be most effectively accomplished, I may be permitted to tell you how, after some thought and experiment, we have managed it in Northwestern.

The final class (I take it that the last year in college is the appropriate one for the purpose) being divided into sections of fifteen for teaching purposes, each one of these sections is given laboratory instruction in the pathology of the eye. As a part of this form of instruction, also, a course in the bacteriology of ocular affections is taught.

In addition to sectional instruction, a portion of each of the weekly lectures is devoted to the histology and pathological anatomy of the ocular apparatus illustrated chiefly by stereopticon views.

Of all these methods of imparting information regarding these alterations in structure and anomalies of growth and nutrition that make up the science of human pathology, I regard as the most important that which the undergraduate student receives in the laboratory. Here, under a competent teacher, he makes a systematic study of those tissue alterations which he is at the same time learning to recognize from clinical observation in the dispensary and from lectures in the amphitheater. It serves to complete and fix in his mind the mental picture, often uncertain and shadowy, with which he has been impressed in hospital wards, in the operating amphitheater and in the lecture room. Each member of the class studies, under the eyes of an instructor, a certain number of typical microscopical slides that represent as far as possible the commoner

diseases of the eye—those that he is most likely to encounter in practice—draws them, asks and answers questions about them and in particular endeavors to acquaint himself as thoroughly as possible with the pathological histology of the parts. The last of these monthly lessons consists of a general review.

In addition to an examination of these microscopical specimens, a large series of gross preparations, in formalin jelly, in Greeff bottles and as fresh material are gone over. Finally, each student is presented with a series of twenty-five or more different, typical slides which he has already studied, for use after he has left college. This is done partly as a reward for the close attention necessary in all effective microscopical work and partly in the hope that it will stimulate him to continue to study not only minute eye changes, but general morbid histology as well.

Not much remains to be taught the undergraduate student of ocular bacteriology in any well regulated medical school, since, as a junior, he is pretty well drilled both in the theoretical and practical aspect of that study before presenting himself for ophthalmic instruction. However, several hours of the monthly sectional teaching is given over to emphasizing effective methods of detecting a few of the bacteria that are prominent from the ophthalmic standpoint—the Morax-Axenfeld diplobacillus, the Koch-Weeks bacillus, the xerosis bacillus and one or two others whose activities are to a large extent confined to or assume important phases in the tissues of the eve. In all this teaching, my assistants and I try to recollect that we must not attempt to make ophthalmologists of undergraduate students. I think I can safely say that all the teaching in our department is in sympathy with one central idea—to impart such instruction as, in our judgment, will be of most value to students in their future career as general practitioners.

With postgraduate students the case is somewhat different in that the instruction meted out to them should vary with the individual need. It may be stated that, as a rule, the physician who desires a course in ocular pathology is better equipped and better trained than the average postgraduate student, as I used to know him when I taught in the Chicago Postgraduate Medical School. Unfortunate is it for postgraduate teaching in America that the usual, indeed the popular, demand is for a six weeks' course in refraction, varied or not with a desultory attendance upon the practice of a clinic and operating room. While there are notable exceptions to the rule, our towns are being filled with men otherwise competent, whose practice of ophthalmology is based upon a few months of this incomplete and hasty sort of study. It can not, therefore, be too

strongly insisted upon that an earnest investigation of the elements of ocular physiology, anatomy and pathology should precede or at least run parallel with the clinical study of ophthalmology. In Northwestern, if I may again be pardoned an allusion to the school I know best, we decline to teach refraction, or ophthalmic operations or to give purely clinical instruction apart from these studies. We gladly furnish to the student as many or as few courses in the anatomy, physiology or pathology of the eye as he wishes, but if a physician wishes clinical instruction, if he wishes to "fit glasses and do operations," as he is generally pleased to term it, he must remain with us for at least six months and give a goodly portion of this time to laboratory work.

All courses are given by special instructors whose connection with other departments of the university enables us to have their cooperation, most of the instructor's fees being paid by the students themselves.

I would suggest that this scheme, modified, of course, to suit individual needs, be adopted by medical schools generally.

A course in laboratory pathology, including instruction in practical bacteriology, modern methods of hardening, preserving, sectioning, staining and mounting and studying eye sections would be a boon to those ophthalmologists who wish to keep abreast of the times. Likewise, in the case of the ophthalmologist already in practice, the accumulation of studied specimens—especially slides from cases worked out clinically—may well occupy at least a small portion of the time which he must properly give to his professional studies. Once a foundation is laid by a few months of this form of postgraduate study, it might readily be continued by concurrent reading and laboratory work at home to be refreshed and revived by short annual or biennial visits to the laboratory of a well equipped medical college.

In furtherance of this scheme, I see no reason why any one of our undergraduate schools should not enter the field of postgraduate teaching. The adoption of such a plan would, among other results, elevate the standard of postgraduate instruction—particularly in ophthalmology—and would soon make it unnecessary as well as undesirable for our American students to go abroad, as they now do, for any considerable portion of their instruction in matters pertaining to diseases of the eye.

THE OPHTHALMOLOGY FOR STUDENTS OF GENERAL PRACTICE.

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Definition: General practice does something for every class of cases; special practice, everything for a single class. General practice ophthalmology must harmonize with other college courses and meet the needs of the family physician; special ophthalmology supplements college courses and family practice. General practice is a large load drawn slowly by many horses; special practice, a light load drawn swiftly by a single horse. General practice is extensive farming; special, intensive. For convenience of discussion we shall call "the ophthalmology for students of general practice" "general practice ophthalmology," as contrasted with "special ophthalmology."

. Standpoints of study: "General practice ophthalmology" may be studied from many standpoints, as:

Its relation to other college courses; to other kinds of family practice; to the entire field of medicine; the needs of the laity; and to special ophthalmology.

I. Relations of general practice ophthalmology to other college courses. Respecting these courses, it is to be noted that the last half century has projected into medicine many radical discoveries and revolutionary inventions along fundamental lines. Instruments of precision, laboratory work, antiseptic methods, new serums, have introduced a possible exactness before undreamed of. Anterior to this epoch, one teacher was responsible for an entire course; so the mastery of his lectures was the mastery of his course. Such mastery equipped the young practitioner for his life work, giving definite ideas on which to begin the management of his first cases—ideas that were the result of his teacher's long study and active practice, and so worthy of confidence. With increased material and the introduction of laboratory and clinical methods, many teachers were needed in each course. The results were easy to see as that "too many cooks spoil the broth"; confused by conflicting instructions, on meeting his first serious case the young doctor often hesitates, and another is substituted.

The number, length and quality of college courses vary; in Cornell there are twelve general and thirteen special, ophthalmology

getting ten lectures and twelve hours of section work, being classed as a minor subject. Doubtless Cornell, with other leading colleges, is struggling to so proportion and harmonize these twenty-five courses that they shall afford the student the best chance to become a first-class family physician.

A study of all American medical college announcements as related to their "ophthalmology for students of general practice," showed:

- 1. An utter lack of uniform requirement in hours of study; subjects studied or amounts of such study; in clinics; recitations; or demonstrations.
- 2. Such mixture of general practice ophthalmology with special as is confusing to both general and special students.
- 3. Not one institution made clear what the student must know and be able to do. Surely the student of general practice ophthalmology has our sympathy in his endeavor to learn from college announcements the nature and extent of the job before him. The situation is the more distracting, as like conditions exist in each of the twenty-five or more courses. Yet, since each course is a selection from a vast pile of settled facts, it is fair to expect the selector to give the student a list of the subjects selected, with the amount of each.

A short time since, at the meeting of a Michigan county medical society, a poll was taken of the members relative to the instruction they had received in ophthalmology. Not one had heard a lecture on refraction, much less been taught to refract; all had seen plenty of eye operations, but none had ever operated; a few of their eye cases went to the special ophthalmologist, but most to the opticians. In all large towns opticians practice ophthalmology; in the country, traveling opticians live on neglected cases of refraction. Over the same area are cases of blindness from eye infections, which family physicians have failed to treat wisely. Surely something must be defective in the training of family physicians, that they are unqualified to occupy this neglected field of medicine.

Evidently the time and energies of the average medical student are fully occupied with existing courses, so that if he is to be better trained in general practice ophthalmology a new deal must be made. What shall this be? Time forbids an answer now, but we may inquire:

1. Is the time allotted each college course such as to produce the best family physician?

- 2. How much of each course is inaccurate, misleading, untrue or simple padding?
- 3. What part of the course on ophthalmology has any fitness for the working needs of the family physician? The writer has a strong conviction that were all college courses free from chaff and full of good wheat, there would be plenty of time and energy for a general practice ophthalmology adequate to enable a family physician to treat cases now neglected or in the hands of opticians.

An important factor in the working value of a medical course is the teacher. If he have learned the art of teaching as well as the art of medicine, he can so systematize his subject, and stimulate the student, that far more can be accomplished within a given period. That a doctor should acquire the art of teaching by practicing on students is quite as bad as a layman learning the art of medicine by practicing on the sick. General practice ophthalmology needs men trained both in medicine and pedagogy to furnish students the best college course, and give family physicians a fair show in actual practice.

II. The relations of general practice ophthalmology to other kinds of family practice. The family physician does team work; side by side with ophthalmology are dermatology, obstetrics, gynecology, laryngology and other classes of practices—all limited as in ophthalmology. He finds that his ophthalmology helps his internal medicine, his neurology, his obstetrics, and every other class of cases; in return, every class of cases helps his ophthalmology. He comes to realize, as a simple specialist can not, the helpfulness of one class of practice to another, and to all combined. Thus, the student's failure to master general practice ophthalmology mars the harmony of his education and unbalances his practice, as does the lack of one horse from a team cripple its power.

III. The relations of general practice ophthalmology to the entire field of medicine. Already we have noted the fact that because the family physician lacked adequate equipment in ophthalmology, vast amounts of medical practice have been neglected by the profession and picked up by laymen, termed opticians; and many eyes lost from unchecked infectious eye diseases. In these and allied ways general medicine has been discredited and impoverished, the family physician has lost much in fees, prestige and mental quality.

IV. The relations of general practice to the needs of the laity. The laity need doctors when their eyes are disabled, and to teach such habits as will restrict their disabilities to a minimum. In towns the well-to-do can secure the services of special ophthal-

mologists; and the very poor relief at hospitals and dispensaries; between these two extremes is a large class unwilling or unable to pay the special ophthalmologist and without the dispensary habit. This class is a large patron of opticians, though they have family physicians who ought to have trained them better. (Alas, the family physicians never were taught the situation, and so too often are allies of the optician, instead of their own specialists.) For this grave situation (from a professional standpoint) the only remedy is a qualification of every family physician in general practice ophthalmology. In regions distant from towns, conditions demand of the family physician an ability to care for all minor eye troubles, and an obligation to place the major ones in the hands of a special ophthalmologist. The laity needs an all round physician all the time, a specialist occasionally.

V. The relations of "general practice ophthalmology" to "special" will prove satisfactory only when both parties have a general practice ophthalmology through which they may cooperate. This common knowledge will enable the family physician to detect ocular disabilities now unrecognized, treat the simpler, and refer the rest to a specialist, with a promptness essential to the best results. As this practice prevails, eye practice now in the hands of opticians or neglected will come under the control of competent physicians. The specialist should render positive aid and encouragement to the family physician as he seeks to cultivate this unoccupied field.

The principles inherent in a general practice ophthalmology may be stated thus: 1. The several college courses should be proportioned on the basis of their value in making the "best family physician," a task for college faculties, or, in their failure, for state licensing boards. 2. The materials for each course, didactic, clinical, demonstrative or laboratory, should be selected by the same standard. 3. Each course should be outlined with unmistakable exactness, so that the student may know definitely, at the beginning, what he must master, and how much. 4. As abundant facts exist to occupy every course, all else should be excluded, leaving all wheat, but no chaff. 5. No teacher should advocate methods of practice, the use of remedies or operations, unproved by his own experience as the best known. 6. So far as possible, students should have experience in each mode of practice; make the examination; direct the treatment; and (under their teacher) be responsible for the results. College courses conducted along these lines would enable the student of general practice ophthalmology to perform an amount of high-grade work paralyzing to his neighbor trained in a hap-hazard manner.

The subjects of a general practice ophthalmology will vary with the selector's training. That he might have the judgment of professional leaders, the writer mailed a circular letter to about a hundred special ophthalmologists, surgeons, professors of practice of medicine, neurologists, and family physicians, asking two questions: 1. What, if any, knowledge of ophthalmology is essential for the best equipment of a general practitioner? 2. What classes of eye cases should he be prepared to treat? (For the prompt and courteous answers to these queries I cordially return thanks.) The replies may be grouped as follows:

- A. Those who thought no general practitioner should treat an eye case, but send every one to a specialist.
- B. Those who believe the family physician should be able to practice special ophthalmology and special everything else, do all eye operations as well as the operations of gynecologist and general surgeon.
- C. The neurologists were strong on those points at which ophthalmology touched their work; holding that to those should be added an ability to manage eye infections, including iritis, and differentiate glaucoma from iritis, etc.
- D. Many believed the family physician should treat infectious eye diseases; diseases of the uveal tract; and make a correct diagnosis of optic neuritis.
- E. Few believed the family physician should be able to recognize and treat cases of simple presbyopia, myopia and hyperopia.

With much hesitation the writer ventures the following outline of the subjects he would group in general practice ophthalmology:

- 1. It would not include operations within the eyeball, or on the eye muscles; the treatment of muscular unbalance; or complicated cases of refraction.
- 2. It should qualify students to recognize and treat: injuries of the eye, except foreign bodies within the eyeball; all infections of the eye; diseases of the uveal tract; and simple presbyopia; simple myopia, and simple hyperopia.
- 3. It would enable students to make an intelligent inspection of the eyes; to note the movement of the lids and eyeballs; the size of the pupils, absolute and relative, their motility, and changes with intensity of light; the color of the iris, etc.; to take the visual fields roughly with fingers or blackboard, noting their size, shape and similarity in the two eyes; to note the tension of the eyeballs as compared with the tension of a known healthy eye; to have practice in everting the lids; with study of the appearance of the conjunctiva and adnexa.

4. It would practice students in simple refraction until they were both familiar with methods and reasonably sure of their results. It would familiarize them with convex and concave glasses, both in the trial case and as sold in the shops, and the adjustment of frames to different faces. General practice ophthalmology would enable the student to differentiate the several forms of conjunctivitis; the varieties of iritis in their different stages; the several lid disorders; redness of the conjunctiva from a foreign body, from a conjunctivitis, keratitis, or iritis; a dacryocystitis from either a chalazion, or hordeolum when situated near the inner canthus; a corneal opacity from cataract; glaucoma from iritis, conjunctivitis or corneal ulcer.

In treatment, general practice ophthalmology will utilize laboratory findings, in doubtful cases of infectious eye disease, and apply the agents known to destroy the infection; as silver salts in gonococcus infection, zinc sulphate in diplobacillus of Morax-Axenfeld; in blepharitis it will use mercury ointments and plus correction of refractive defects; in corneal ulcers it will use tincture of iodin; expression and antiseptics in trachoma; atropin with mercury or salicylates internally in iritis; eserin in glaucoma (till the case can reach a specialist); hot water locally in most cases of acute inflammatory disease and malnutrition. The family doctor's knowledge of intestinal disorders will prove helpful in all these cases.

General practice ophthalmology will teach the student the use of the convex lens for oblique illumination; use of the foreign body spud; of the knife and scoop for the removal of chalazia; the use of the ophthalmoscope to recognize a normal fundus. It will teach the nature and effects of atropin, homatropin, euphthalmin; eserin, cocain, eucain, dionin, boric acid, yellow oxid of mercury ointment; the silver salts; zinc sulphate, copper sulphate and hot water. Assuming that "general practice ophthalmology" is necessary for the best interests of both profession and people and the art of medicine, how may it be secured with least friction at the earliest date?

- 1. We need the widest publicity of existing conditions, and an exhaustive study of the means for their betterment.
- 2. We must enlist the several state organizations in the education of family physicians for their enlarged sphere—the first care of all the disabled. In Michigan the state medical society has directed its council to take the matter up with their county societies and the State Board of Registration.

CONCLUSIONS.

- 1. General practice ophthalmology is all of ophthalmology the student can master without violence to other courses; and a family physician practice in harmony with his work.
- 2. It includes four factors: the ability to recognize and treat eye injuries (except foreign bodies within the eyeball); the recognition and treatment of all eye infections and diseases of the uveal tract; the recognition and management of simple presbyopia, simple myopia, and simple hyperopia.
- 3. The best interests of the profession and laity demand a mastery of general practice ophthalmology by every physician.
- 4. The medical college obstacles to this can be removed by eliminating from every course all chaff; by adjusting the proportion of courses to the actual needs of the family physician; and by insisting that all the professors be trained in the art of pedagogy, as well as the art of medicine.
- 5. The machinery of state medical societies and the American Medical Association should be used to awaken the interest of licensed physicians and induce registration boards and medical colleges to place among their requirements a "general practice ophthalmology."
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TEACHING THE SUBJECT OF OCULAR REFRACTION.

EDWARD JACKSON, M.D. DENVER.

With regard to the teaching of refraction, medical students may be divided into two classes; those who will take no especial interest in diseases of the eye, and those who will practice ophthalmology, the recognition and measurement of errors of refraction constituting a large part of their daily professional work. It may be questioned whether the latter class should receive recognition in the undergraduate teaching of medicine. But as students come to the study of medicine better prepared by collegiate training, and the previous study of physics, chemistry, biology, etc., the final year of the medical course may be given more largely to elective studies; and among these the study of refraction, as a preparation for the practice of ophthalmic surgery, may well find a place.

The distinction between teaching refraction as part of the general medical education and teaching it as a basis of special practice is emphasized because the accurate diagnosis or measurement of the refractive errors of the eye is probably the most highly specialized branch of medical practice, the one that differs most from the mass of work done by physicians and surgeons. Proficiency in it is attained only through a training, different from that which gives mastery in other branches of practice.

Any one can hold a series of glasses before a patient's eve and ask him to tell if one suits him better than another. The optician undertakes the measurement of refraction after a course at some "college of ophthalmology" of a month or a week, or without any instruction whatever. But the community is amply supplied with "refractionists" of this grade. To send out young doctors who will do this sort of work is to demonstrate to the community that the claim that refraction should be wholly in the hands of the medical profession is false. To teach a medical student, well-trained in other respects, that the crude guessing he can do after the instruction given to the large classes of our medical schools, will do justice to patients suffering from eye-strain, is to teach him a low estimate of the importance of refraction work. The suggestion to get a trial case, and do a little work on refraction, while waiting for general practice, is partly responsible for the low estimate often placed on the value of the accurate correction of refractive errors.

Admitting that all medical students can not be trained in the accurate diagnosis and correction of errors of refraction, let us consider what instruction upon this subject can and should be given to every student of medicine. Preliminary education ought to furnish a sufficient knowledge of mathematics and physics, and even of general optics. In time doubtless it will. But, up to the present, the student who has received a good preliminary training in these branches is the exception. Even the college graduate may come to the medical school ignorant of optics. As things now stand the first duty of the teacher of refraction is to find out the deficiencies in the preliminary training of his students; and, so far as he can in one or two lectures, supply the more important preliminary facts.

It is not an extensive or general knowledge of mathematics that is required. But the student ought to have a good acquaintance with the elements of algebra, plane geometry, and plane trigonometry. The essential thing is that he shall be able to think in geometrical terms; be able to grasp geometrical conceptions of quantities and relations. I have never attempted to take medical students over the subjects of geometry and algebra in a preliminary lecture, but I have sometimes given a little time to the trigonometrical functions, and their relations to each other, and generally go rather minutely into the most elementary optics. Even with the very limited time allowed to ophthalmology in the medical curriculum, a lecture or two spent in drilling the students in these elementary conceptions results in a saving of time before the course is completed.

The ability to think in terms of geometry is cultivated by the general use of diagrams, models and apparatus. The teaching of the theory of refraction should be constantly aided by their use. It has been too much the custom to reserve this teaching for the course in ophthalmology, commencing in the third or fourth year of undergraduate medical study. It can better be arranged to give it as a part of the courses on anatomy and physiology, to the second year medical students. Given at this time it allows the ambitious but poorly prepared student an opportunity to do, outside of his regular course, the necessary work in mathematics in which he may have been deficient.

Some thirty years ago Gowers wrote of the ophthalmoscope: "The use of the instrument and the examination of the normal fundus are parts of practical physiology, and might with great advantage be taught in that course in conjunction with the study of the anatomy and histology of the eye." Gowers' point of view was

not that of the ophthalmic specialist, but of the physician who appreciated the general importance of the ophthalmoscopic symptoms of disease. If the anatomy and physiology of the eve are taught with the same thoroughness as are other parts of anatomy and physiology, little time need be devoted to the physical and physiologic sides of the ocular refraction when the course on ophthalmology is reached. This latter course may begin with the clinical aspects of eve-strain arising from errors of refraction. With these all students should be made thoroughly familiar. In the majority of cases of headache the eves are most at fault. In every case of headache the differential diagnosis must be made between headache arising from eve-strain, and that due to other causes. Such differentiation of headaches and their proper treatment constitute an important part of the work of the general practitioner. The headaches of eve-strain can be made to throw light upon the pathology of headache in general. There is every reason why the headache, nausea, vertigo, and other nerve symptoms that arise from evestrain, should be thoroughly studied by all who intend to practice medicine in any of its branches.

In teaching the clinical aspects of refractive errors the so-called "case method" may be employed with advantage. That is, the notes of striking and typical cases thoroughly worked out, should be brought before the student to be studied like a case in actual practice. The presence of the patient is not necessary where the symptoms are so largely subjective. Later, patients may be examined and treated before the class; but a general comprehension of the nature and importance of the symptoms produced by ametropia will be more quickly and more forcibly impressed by selected case histories.

Having taught the medical student the importance of eye-strain under the conditions of our modern civilized life, the symptoms that indicate it, and the reality of their relief by correction of ametropia, I would give the general student of medicine a mastery of certain rough tests, viz., the pin-hole test to improve vision lowered by any form of ametropia; the discrepancy between distant and near vision for the recognition of myopia; the increased distance of the near-point, and the ability to see clearly at a distance through convex lenses, as distinguishing hyperopia; and the varied distinctness of the radiating lines indicating astigmia. With these tests, however, must go careful emphasis of the facts: that a patient may have ametropia sufficient to cause serious symptoms without noticeable impairment of vision, or improvement with a pin-hole test; that in exceptional cases he may have a normal near-point, and

be unable to see at a distance through convex lenses, yet have hyperopia; and that with important astigmia he may state that the radiating lines all look alike.

Finally, the general student may be given a few cases of ametropia, to work out the diagnosis and correction for himeslf. These with proper supervision and criticism will impress upon him the difficulties that attend the accurate measurement of errors of refraction and instil a proper caution as to the prescribing of glasses. To carry him through all difficulties and make the average medical student a master of this subject is impossible in the present undergraduate medical course. It may become in large degree possible when the last year of the medical course is devoted to electives, so that for students interested in it, a sufficient part of the time can be given over to this particular kind of work. But it will always be part of the training of the specialist.

The measurement of ocular refraction is as much a matter of physical measurement as the surveying of land, or the weighing of the results of chemical analysis, or the measuring of the angles separating different stars. Those who are familiar with the teaching of physical science know that some persons never can become expert astronomers, or analysts, simply because they can not be trained to make accurate physical measurements. The so-called personal equation, the inaccuracy that necessarily attaches to the measurements made by a particular individual, becomes an important consideration in the exact observation of physical phenom-The training of the practical "refractionist" must be very largely training in the making of accurate physical measurements. For objective methods this is the whole of it. For measurements made by subjective methods the "refractionist" must also become a practical psychologist. The preliminary training for the accurate measurement of refraction may be accurate work in the physical or chemical laboratory, or the acquirement of the technique of microscopy, or even of skill in a manual training school or mechanical trade. It is something absolutely apart from the ordinary literary education; or from that class of observation and deduction that is equally useful to a detective or a medical diagnostician. preliminary training will be of great assistance to the student of refraction. But if he lacks it, the deficiency will have to be supplied by additional drill with the test lenses, the skiascopic mirror, the ophthalmoscope, and the ophthalmometer. Even with the best drill some persons will always remain inaccurate in their measurements.

To discuss in detail the teaching of each method would extend this paper far beyond the allowed limit. But I would emphasize that

every one of these methods should be made the subject of prolonged, painstaking, minute instruction. To set the student down before a patient in the dark-room, give him an ophthalmoscope and tell him to find out which lens gives the clearest view of the patient's fundus is not enough. He must be shown how to guard against the patient's accommodation, or his own. It must be pointed out that the refraction may vary 2 or 3 diopters between the center and the margin of the dilated pupil. He must be made familiar with the effects of differences of level in different parts of the fundus. He must be warned against being misled by blurring that no lens can clear up. His attention must be called to the fine vessels, details of pigmentation, that offer the best tests of exact focussing. He must be trained in the modifications of the general method required for the measurement of astigmia. For the subjective tests the details that should be made the subject of special instruction are even more numerous, and more important. Only by prolonged and careful training with regard to them can the student attain such skill in the measurement of refraction as can rightly be demanded of the specialist in ophthalmology after fifty years of good scientific work by the students and successors of Helmholtz and Donders.

The relief of patients who suffer from the effects of ametropia depends absolutely on the accurate measurement of their refractive errors. Only when such an accurate measurement has been made can we properly consider the questions of physiology, convenience or prejudice, that may influence our prescribing of lenses. Whatever the superstructure we choose to erect upon it, a solid foundation is essential. Accurate measurement of refraction is a large part of the foundation of ophthalmic practice. Here lies the importance of drill in the accurate methods of measuring refraction.

This drill can only be given where the student can go to work upon the individual patient; and spend the necessary time in mastering the difficulties each particular case presents. This may be in a clinic, where the number of cases and the room for working are sufficiently large to furnish such an opportunity, or it may be in the private office of the instructor.

Whatever our disagreements as to the frequency with which it is necessary to use cycloplegics in practice, it must be admitted that for the student learning to measure refraction it is better to be rid of the difficulties raised by accommodation. It is better for him to work in a clinic where cycloplegics are used for the patients who have not become presbyopic. When he has learned to measure refraction accurately, by the various methods, with complete cyclo-

plegia, he can go forward to overcome the difficulties raised by activity of the ciliary muscle, in so far as these can be overcome by means other than the use of cycloplegic drugs.

The apparatus necessary for the teaching of this subject includes that used in the measurement of refraction in actual practice; with diagrams, or better the paper or blackboard for their extemporaneous development. With a strong convex spherical lens and a card one can give a better conception of refraction at spherical surfaces than by any number of written or spoken words. The addition of a cylindrical lens with the shifting of the card from one focal line to the other and beyond, has the same value in illustrating astigmia.

Still optical models of the eye made with a glass chamber, that can be filled with smoke, or with a solution of fluorescin, to illustrate the course of the rays after refraction, are of real value. The same is true of the thread models of Knapp, or the wire and wood models of Burnett; and there is a great variety of apparatus for the beautiful illustration of the subject of optics. The various schematic artificial eye can be utilized for the teaching of skiascopy and the measurement of refraction with the ophthalmoscope, and the artificial cornea, is at first better than the natural cornea for practice with the ophthalmometer. But there comes a time when no apparatus can take the place of actual clinical work; and from the beginning very simple lens arrangements, well-used, serve every purpose.

In conclusion, the following points seem worthy of discussion: There is only a certain line of instruction with regard to refraction that can profitably be given to all undergraduate medical students, under the limitations of the present medical curriculum.

The courses on anatomy and physiology should give to every student a good general knowledge of the refraction of the eye and the use of the ophthalmoscope. A certain knowledge of mathematics and physics should be required of every student who undertakes to study refraction in preparation for ophthalmic practice.

The measurement of the errors of refraction is a physical measurement to be learned by actually making such measurements; and for which laboratory training in physics is the best general preparation.

Through all the teaching it is of highest importance to help the student to clear geometrical conception, and to this end diagrams and models are to be freely used. DISCUSSION ON PAPER OF DRS. WOOD, CONNOR AND JACKSON.

Dr. Schneidemann, Philadelphia: -As the question of teaching ophthalmology, and particularly refraction, comes up to-day, students may be divided into two classes: first, those whose preliminary education included mathematical training, say through trigonometry, and, second, those who are without this training. While the former class may have forgotten nearly all they knew, their previous acquaintance with the methods of mathematical reasoning will be of the greatest value to them in mastering as much of geometric optics as is necessary for an intelligent comprehension of the subject. Training in a physical laboratory or an astronomical observatory would be of the greatest value for the practical refractor, for it is by the application of just such methods that objective refraction is accomplished, and no one can do good work in this department who is not acquainted with objective methods.. Still, mental training of all kinds is of the greatest value. Professor Young, the eminent astronomer, used to say that the best preparation for a student of astronomy was a course of Latin and Greek. What he meant was that the cultivation of different parts of the mind was of greater value than exclusive specialism, and that such a mind could readily and quickly be taught any desired branch of specialism. But, after all, what is really needed to make a man an accomplished refractor and ophthalmoscopist is direct personal supervision and instruction, just as in the case of any other practical matter, whether it be finding the longitude or shoeing a horse. Take a man into the dark room day after day; teach him how to seat his patients, how to arrange the light, how to place himself, how to hold the ophthalmoscope, etc., and point out to him what he is expected to see and criticize his faults. Carry out the same process with the other appliances, and apply the same minute process to the test case, and there is no reason why any man of common sense who is fit to be a physician should not in a reasonable time become competent to do this work.

Regarding the amount of ophthalmology to be taught the general practitioner, there are at least some important points that every one who puts out his sign ought to know, and the more so the further he is from a city or any place where he can get aid, such as the recognition of ophthalmia neonatorum and acute glaucoma. Almost everything else can wait. Certainly every general practitioner should know and be taught enough to recognize and refer proper cases to a specialist. Some send us cases with the most unreasonable expectations. They get a case they suspect to be Bright's disease and expect us to make the diagnosis, not knowing that the retinal lesions are a late occurrence in this disease, and that if they are present the chances are the case will not live two years.

Dr. Grosvenor, Chicago:—I would not like you to gain the impression that Northwestern is the only medical school where they teach ophthalmology. We have in Chicago, also, Rush Medical College, where we teach it to undergraduates. Our students are given a most thorough training in the fundamental branches down on the campus of the University of Chicago. This includes most careful study of the anatomy, physiology, neurology and physics of the eye. Here, too, they are drilled in general and special pathology.

Then they come over to the West Side for their last two years of clinical work. Courses in the pathology of the eye are given by Drs. Brown Pusey, E. V. L. Brown and F. A. Lane. A recitation and lecture course is given which requires study on the student's part. Next comes the course in "Practical Ophthalmology." This is intensely practical, training the individual student in the technique of examining patients in the dispensary clinics. Teaching them how to turn over a lid, how to study the

cornea, iris, lens by various methods; then how to use the ophthalmoscope, studying each others' eyes until well acquainted with the normal, the fundi of patients are examined and diagnosed. Thus they are prepared for the clinical course of Professor Wilder.

When they go to the medical clinics of Professors Billings, Sippy and Herrick and are given a case to work up and report on before the class they have to go over that patient from head to foot and bring in a report on that case—complete, exhaustive—and they have to report on the fundus and eye conditions, as well, and if not they are sent back to examine that fundus; and these teachers know what is what, and if their students do not do it they are sent back to do it. The result is that they know how to examine an eye. For the postgraduate I wish you could have all heard the paper of Dr. Shambaugh in the other room. I want you all to read it.

Dr. Baker, Cleveland:-I have been a full professor, teaching for twenty years in one of our local medical schools, and at commencement my vote is necessary in order to get a diploma, and I impress upon students when they first come to my clinic that they have to pass my examination if they expect to graduate. When I was a student, about all I was taught about eye diseases was to send the patient to a specialist. There is no reason why any intelligent student, who has had a preliminary training in mathematics and physics, and has spent two years in laboratory work, can not use an ophthalmoscope the first time he attempts it. When I first commenced teaching ophthalmology, many students could not learn to see the fundus because they did not have preliminary training in the use of the microscope and other laboratory methods. As Dr. Jackson says, some are hopeless, but the average medical student of to-day can observe accurately, and in four weeks I can teach any student to work out refraction cases better than any optician ever did. Indeed, the majority of our students buy a test case and do refraction work fairly well, and if they do not they know enough to send it to some one who can. The men who send me cases in consultation are men who know most about the eve. They realize their limitations. It is the man who does not know the difference between hyperopia and myopia who sends his patients to the optician. I am fully in accord with Dr. Connor's paper, and tried to say the same thing at the meeting of the American Medical Association at Saratoga. The sooner we come to his point of view the better it will be for the general practitioner and eventually better for the public.

DR. VALK, New York:—I rather think I am in the category of the gentleman Dr. Connor mentioned. Although I do not draw a salary, I think this way, gentlemen, because the subject is extremely interesting to me. I happen to be a teacher somewhat of ophthalmology and I am interested in this subject, and yet I think about as I did thirty or forty years ago. Thirty odd years ago, before my graduation, I was associated with our late president of the New York Postgraduate School, St. John Roosa. In his clinics he had a large number of undergraduates, and he taught them the same principles of ophthalmology. You should teach something about the ophthalmoscope and how to use it, but when you get down to the practical treatment of disease of the eye, in my opinion, I think it ought to be entirely in the hands of the specialist. You talk about teaching a man to use the ophthalmoscope and know what he sees. Where are you going to draw the line as to how far he should go and where stop? The man who is taught the different subjects as Dr. Jackson mentioned in his paper is an ophthalmologist by the time he knows all that! He is not a general practitioner. You teach him to diagnose a case of glaucoma; he goes out into general practice and he may practice fifty years and never have a case of glaucoma under his care. He will never have a case to see

or take care of. The difficulty is, Where are you going to draw the line? We say it is all very nice to use the ophthalmoscope, and we hear neurologists say, "Yes, he uses the ophthalmoscope and can make a diagnosis of neuritis." And you ask, "Can you make a diagnosis of mixed astigmatism?" He says, "No." And yet you all know it has the same appearance as neuritis. You do not know where to stop. The profession demands that if we are going to be ophthalmologists we must not be general practitioners. I suppose a general practitioner must know ophthalmia neonatorum when he sees it and has got to know how to treat it, but when it comes to the refraction of an eye you have a different proposition. People think refraction is a very simple thing; anybody can fit glasses. I think ninety-nine patients out of a hundred come into my office with glasses on their noses. They have all been fitted (?), yet it is not simple. In order to make a diagnosis we must have the ophthalmoscope. I hope the day will come when we as ophthalmologists will be able to fit glasses without asking our patients any questions at all, as pediatricians will make a diagnosis of the disease of a child who can not answer his questions. So in an undergraduate school-where I have never had the honor to teach-it seems to me the teaching of ophthalmology should be along general lines so that when the practitioner has symptoms pointing to the eye he may judge what is best to do in that case. You must give your undergraduate students a general knowledge, but when it comes to a diagnosis of these special conditions, it seems to me you are giving them more than they can master. We might say the same of neurology and other special work.

Dr. Reber, Philadelphia: - While I belong to the younger generation of ophthalmologists, I have, for the past ten years, enjoyed the advantage of doing both postgraduate and undergraduate teaching and have had opportunity to study the needs of both classes of students. For the past three years I have directed the teaching in the ophthalmic department of the Temple University. Teaching the use of the ophthalmoscope to these undergraduates has been entirely omitted. This is rather dogmatic ground, but I take it unhesitatingly. Any one, student or layman, can be shown the optic nerve after fifteen to thirty minutes' instruction, but it will take six months to one year to be able to interpret what is seen-and that is the crux of the whole matter. As the medical curriculum is now constituted (and bids fair to be for some time to come) time does not afford to train the undergraduate to so high a technical point. Until a man has looked at a thousand eyegrounds his opinion is worse than useless-it is dangerous. Why, then, burden him with half-learning a bit of technic that will generally prove a waste of time. That the regular undergraduate should thus expend his time and energy is, to my present mode of thinking, an error and a fallacy,

The refinements of ocular pathology seem to me to be absolutely post-graduate work. Surely the undergraduate needs all the time he can spar for the principles of general pathology. This particular branch is the $b\bar{e}te$ noir of the average medical student, and to further add to his difficulties

does not appear to me the part of wisdom.

Inasmuch as this has resolved itself into an experience meeting, I may say that in our university seventy hours of work are given to this branch in the final year. The ideal result would be attained by following the lines laid down by Osler, who believes in four didactic years, to be followed by a compulsory year in a hospital, at the end of which time the student shall be granted a diploma.

For undergraduates it is my feeling that they should be taught all that is meant by external diseases of the eye. Also that they should be made to understand the influence that eyestrain (refractive or muscular) bears to the general health and the relation of the eye to general disease.

I freely subscribe to what all the other gentlemen have said, but I am also persuaded that a working knowledge of any specialty calls for such intensive industry and mental concentration as to make it impracticable for the average medical student as the curriculum is now observed.

Dr. Reeve:-It has always seemed to me a great anomaly and defect in medical education that a young man presenting himself for a degree should be expected to detect a small nodule on one of the cardiac valves, and yet be unable to diagnose conjunctivitis. And I have set myself against this. In the institution with which I am connected, ophthalmology and oto-laryngology are obligatory. Our students have to pass an examination in these subjects. In the first year of the medical course, physics, chemistry, etc., are taught, and they are given the laboratory physics. In the second year the student is acquainted with the physiology of the eye to the extent of mastering the ophthalmoscope and its application. In the fourth year, of a five years' course, they are instructed in the practical use of the ophthalmoscope and other apparatus in the like specialties, on the human subject. In the fifth year, in addition to their didactic course, each student spends six weeks in a clinical class, or in the out-patient department, which, to my mind, is almost more important as offering facilities for medical education, and then the hospital practice proper. Each student is required to endeavor to master points in each case and form a diagnosis. It seems to me that we have to avoid two extremes; one, giving each student so much instruction as to practically put him on the path of ophthalmic practice, and, on the other hand, avoiding giving him that practical instruction which every medical practitioner should have, whether a gynecologist or surgeon or physician. I would not like any man to get his degree, whether M.B. or M.D., and commence the practice of medicine, without being able to distinguish iritis -not glaucoma necessarily, which only occurs in 4 per cent. of casesbut iritis. Because, if he can diagnose iritis he can diagnose glaucoma, and also the ordinary forms of conjunctivitis. We draw the line between the instruction required in the four and the five-year courses. In the four years' course, in the final year, we do not require them to be experts in the use of instruments or apparatus, but simply to know how to use an ophthalmoscope and how to distinguish hypermetropia and myopia and astigmatism and the commoner forms of eye diseases such as can be inspected with the naked eye. We expect them to understand this, and my view is that the year following graduation, which in our university gives M.B. at the end of five years, and at the end of six years M.D., which is given over to special laboratory work, he can take up a group of specialties, surgery and ophthalmological work and what not. And I think in the sixth year it is time enough to expect a man to differentiate the different abnormal conditions of the fundus and be more or less expert in refractive work. But it seems to me an anomaly that men go out with a degree in medicine who can not detect ordinary hypermetropia and ordinary myopia, and yet are expected to diagnose important diseases of the heart and lungs and body.

Dr. Wood:—I agree with what Drs. Jackson and Connor have said in recognition of certain diseases of ametropia, and I believe the difficulty can be gotten over by having instruction given by the professor of physiology as—if I may mention the institution with which I am connected—we do in these conditions. That is, he teaches all students the use of the perimeter and cycloplegics, and the ophthalmometer, and the relation of the various muscles to each other, and so on, as a matter of physiological teaching. When a student comes to have sectional teaching, I quite agree with what Dr. Schneideman has said, that this is the important thing

and more important than the so-called didactic lectures they get. Then they are taught the use of the ophthalmoscope, refraction, etc., and it is not all new to them. After the first year, when everything is fresh, he is taken through this, and once this early teaching has been revived he is much more likely to remember, and it is interesting. One of the causes of their dislike for it is not the difficulty, but the lack of interest. Ophthalmology was not made interesting in my day. We used to thank heaven when the lecture was over. But there is no reason why it should not be made as interesting as any other department of surgery. I am heartily in favor of teaching graduates or undergraduates those things which will be most useful to them in after life. Some seven years ago an article appeared in the New York Record, I think, entitled, "The Difference Between Ophthalmic Diseases That Bite and Those That Scratch." After reading this I became convinced of its value. If we can make the student understand that the things that bite are to be given over to the oculist he may be allowed to practice on those that merely scratch. But he must be able to recognize them, is the important thing.

DR. ALT, St. Louis:-I agree with the last remarks of Dr. Wood, that it is the recognition of the disease that is most important and the most difficult thing in teaching ophthalmology. While I agree with the high ideals in teaching pathology which have been set forth, they do not seem to be obtainable under present conditions. Maybe it can be done in the future. While I also teach some ophthalmoscopy, I do not think the general practitioner uses it to advantage. What I endeavor to do is to teach my students mainly to see, and I find that it is the most difficult work to make them see what is abnormal. As a consequence I do not deliver any didactic lectures except on histology and pathology, with specimens, etc., but I bring patients before the class and do as I have been taught in Heidelberg-let one or more students examine a case and tell me what they see. If he sees what there is to be seen, well and good, and if not I show him where he is mistaken, and in that way I lead him on gradually, and I know I have thus aroused an interest in the student, if only in this particular case, which he will never forget. Such a demonstration is followed by pertinent remarks as to etiology, treatment, etc. Then the class is shown the case. I think this, the oldest, method of teaching is the best and by far surpasses any amount of didactic lectures for most of our students.

Dr. Barck, St. Louis:—It seems to me that the pendulum swings to the other side. In former years there was not enough instruction, but now it seems we give the undergraduates too much. We all agree that all should have a fair knowledge of the most important diseases, their treatment, etc., but there are limitations, and these are fixed by the time at our disposal. Certainly it is more important to give them the more frequent diseases than elaborate instruction in the ophthalmoscope and refraction. The whole discussion, it seems to me, dissolves itself practically into the two following heads: how much instruction in ophthalmology is necessary and desirable for undergraduates, and, second, how much instruction in refraction is necessary and desirable for undergraduates? And it would be desirable that we come to a definite understanding on this point.

Dr. McAllister, Pennsylvania:—A good deal of attention has been paid to the instruction of the student; that does not concern us at the present time who are already in practice. I get cases frequently of ulceration of the cornea, iritis, glaucoma, etc., when too late to relieve. I would like very much if some of the speakers, in conclusion, will explain to us how we can reach best those physicians with whom we come in contact,

the general practitioner, who is not at present able to diagnose at an early stage those diseases of the eye that "bite."

Dr. Byington, Battle Creek:—Surely the more the general practitioner knows about the eye the more he will realize his own limitations and the more inclined he will be to avail himself of the services of a specialist in these diseases, provided he is available. We must bear in mind, however, that many students go out into remote districts where they must do their best for all sorts of cases without the aid of a specialist. The practitioner who is ignorant of eye diseases is apt to attempt more than he who is able to recognize conditions and is cognizant of possible evil results. What is more important for the general practitioner to know about than eye injuries, sympathetic ophthalmia and acute inflammations of the eye? Often it makes a vast difference to the patient what drop of medicine is first instilled into the eye. The more we teach the general practitioner to recognize these conditions the more he will be inclined to refer his patient to the specialist when he is available.

DR. Wood (closing): -I have little to say except that I have not conveyed to you that Northwestern is not the only pebble on the beach, and I am glad Dr. Grosvenor has said what he did, for you all know Chicago is the only place, but I wish you had heard Dr. Shambaugh's paper, because it contains the ideal program for postgraduate teaching. The reason Vienna is known as a medical center is on account of her postgraduate teaching, and if we do not bestir ourselves in America we will not only lag behind, but we will fail to make the progress that is our duty. We will not take the position that surgery occupies in this country. It is a plea for that sort of thing we have been urging. I do not like to see America-and I include Canada-I do not like to see our students going in droves to other countries, when we are quite competent to give them that sort of teaching here. I would like to reiterate the value of the study of ocular pathology by undergraduates and postgraduates. If we have a small number of students studying microscopic slides, it tends to stimulate a desire to know something more about practical ophthalmology and facts that relate to that particular study.

Dr. Connor (closing):—Clearly there are two classes of practitioners to be provided for if the profession is to cultivate the entire field of medicine: the specialist and the family doctor. While I regret that America has failed to provide the opportunities for the fullest development of the former, my paper concerns itself wholly with the latter—what parts of ophthalmology should he know, and what changes are necessary that he may master them?

Much eye practice he should have done has passed to the opticians who have grown rich and powerful thereon; cases of ophthalmia neonatorum he should have treated wisely swell the ranks of the blind. Standing as he does at the portals by which all the sick enter, he is impotent for their wise management, either in treating them himself or placing them in the hands of a specialist, so they fall into the hands of laymen. The only remedy for the elimination of these laymen from medical practice is to train the family physician to recognize all eye cases as they arise in his families; treat the simpler, and place the rest in the specialist's hands.

How shall this change be effected? At its late meeting the Michigan State Medical Society adopted the following plan: Its council was instructed to take the matter up with the several county medical societies that a full discussion of the facts might lead to such a local remedy as was deemed best. It was also instructed to request the State Board of Registration to place in its requirement for a license to practice definite

topics in ophthalmology and the exact amount of each, instead of the present indefiniteness.

Should this prevail, the medical colleges will be compelled to teach their students this definite ophthalmology. I have carefully studied all the college catalogues and failed to find what subjects or how much of each they demanded of their candidates for graduation in ophthalmology. If colleges would publish what subjects and the amount of each their students must master, graduates might enter practice prepared to deal wisely with their first cases and so few slip through their hands for treatment by laymen.

The following incident from a young doctor in Michigan points its own moral: The place is a little town in a rich farming country. A local preacher, kicked from his church for errors of conduct, left town for a couple of weeks and returned to treat eyes with glasses. Soon he wore better clothes, and other evidences of prosperity. Seeing this, a farmer quit hoeing corn, left town for two weeks and returned to practice ophthalmology. His first patient was the local banker, who widely published his belief that he served him better than a distinguished specialist in a distant city. At once his rooms were crowded with patients from the doctor's families. Humiliated by this state of things, the doctor decided to learn how to treat these cases himself and thus hold his families from encroachment by laymen.

As specialists we can render important service to state societies and the American Association, as they may seek to stimulate the profession to qualify itself to care for all the disabled sick in the United States, leaving none for laymen to treat.

Dr. Jackson (closing):—In the discussion of this subject from the proper point of view, it seems just as important for the student preparing for general or family practice to learn ophthalmology as it is for him to learn surgery and other work that is done by the general medical profession: that a man is just as poorly prepared for general practice who goes out unable to use the ophthalmoscope as he who goes out unable to use the stethoscope. I believe the proper conception of medical practice is that all parts are essential. I know it has become very common to set general practice on one hand and specialism on the other. Teaching will not be properly done until every specialty is properly represented in the general education of every medical student, and it is with that conception that I approach the discussion of these questions.

The point has been mentioned that students dread their work in pathol-My recollection is that anatomy was dreaded quite as much. think the reason is the same for both. The work is so largely in the dead house, so far from clinical work. If you can teach anatomy and pathology on the living patient, it will be interesting to the student. You can do that with the ophthalmoscope. I believe the theory of it should be studied. as Dr. Grosvenor said, as laboratory work in physiology, as I saw it done in St. Louis University last winter. The student should early make some acquaintance with the ophthalmoscope as he does with the microscope. He will not become an expert with the microscope by any course in an undergraduate school. Ophthalmoscopy is a form of microscopy. student can know something of the ophthalmoscope as he does of the microscope, and it is just as essential, and perhaps a little more so, because he comes to working on the living patient. It comes closest to clinical work, and is, therefore, a little more worthy of cultivation than any other part of microscopy.

As to the particular subject of refraction, I would not hinder any man from treating the cases he feels competent to treat, and it is not worth

while to divide our field and say that those who do not know very much about refraction should not attempt to correct it. But I do say that poor refraction work is very common, and what is needed to prove the title of the medical profession to refraction work is that they should do better work than in the past, and that refraction work is so highly specialized and different from ordinary practice that a man who is getting a general medical education is going rather further afield and on a more distinctly separate line of work when he takes up ametropia than he is in any other branch.

Dr. Vail:—I have felt this was very important and have refrained from shortening the discussion on that account. We have certainly listened to able discussions and papers on this subject and will feel that we have good views on the subject and have learned the views of others. I feel sure that the only way to correct this evil is to take it into our own hearts and lives and endeavor in our own places to correct the trouble as much as is possible so some concerted action may result from this morning's work. My own idea is that refraction should not be permitted in the early course of ophthalmic teaching. It, like surgery, is the part of our work which brings us our fees and should not be taught until after students have thoroughly qualified in the anatomy, physiology, pathology, diagnosis and treatment of eye diseases. Refraction should come last in the course and should not be taught in six weeks' time.

EXOPHTHALMIC GOITER.

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It is with considerable trepidation I enter upon the discussion of this subject, especially since I am not in accord with such high auhority as Prof. Lewellys F. Barker, of Johns Hopkins University. who says: "In the present state of knowledge and practice, therefore, once a positive diagnosis of exophthalmic goiter has been made, it is, in my opinion, the physician's duty and privilege to recommend operation early." (Jour. A. M. A., Oct. 12, 1907.) In discussing a paper read by Dr. Roswell Park a few years since, before the Cleveland Academy of Medicine, in which he urged the operation of thyroidectomy as a life-saving one, and pictured as only his facile pen can do, the horrible death which almost inevitably was sure to overtake these unhappy patients, I was incautious enough to remark that the only deaths I had ever seen from exophthalmic goiter were on the surgeon's table, and that the natural tendency of the disease was to recover in from one to five years. I was so severely criticized for this statement that I was stimulated to tabulate the late history of some of the cases that have come under my observation. This compilation was undertaken without any reference for publication, but as it has appeared very instructive to me, I thought it might also interest the members of the Academy. I might have tabulated a much larger number of cases if I had included mild ones, recent ones, or those of doubtful diagnosis, but the object I had in view in this research was to discover, if possible. what became of the severe cases in which there was no question as to diagnosis. All the cases here tabulated had tachycardia, enlarged thyroid, and the exophthalmos in nearly every case was great—such cases as would naturally consult an ophthalmologist. They are almost exclusively compiled from my private case books.

Tinnitus Aurium.—At one time I thought this was one of the numerous symptoms of the disease; but, like errors of refraction, the progressive impairment of hearing was what kept these patients under my observation long after the exophthalmic goiter had disappeared. I believe, however, that in all cases of Graves' disease complicated with middle ear disease the noise is greatly aggravated.

N _o	Age.	Sex.	Year.	Refraction.	Exciting Cause.	Remarks.
1	19	F.	1900	L 0.25 ax. 180° V. 20/xx R 0.25 V. 20/xx.	School	Recovered when taken out of school,
2	10	F.	1900	L1.00 + 3.50 ax. 90° V. 20/xxx	School	Recovered in two or three years.
3	30	F.	1901	$L + 0.50 + 0.50$ ax. 90° V. $20/xxx$	Broken en	Recovered in two or three years. Precoclous child. Menstruating. Tinnitus aurium — progressive deafness. Recovered.
4	22	F.	1885	Li.,	gagement. Love affair	deafness. Recovered. Recovered after marriage and
5	42		1895	R. L. R.		childpirth.
6	20	F.	1905	L 1.00 ax. 180° V. 20/xx		except the exophthalmus
7	18	F.	1896	$R0.75 \text{ ax. } 15^{\circ} \text{ V. } 20/\text{xv.}$ $L. +3.00 + 0.25 \text{ ax. } 90^{\circ} \text{ V. } 20/\text{xx.}$	Disappoint	Recovered after marriage. Three healthy children. Died few
8	17	F.				months ago, fourth childhirth.
9	23	F.	1895	L. + 2.00 + 3.00 ax. 90° V. 20/xl. R. + 3.00 + 3.00 ax. 90° V. 20/xl. L. + 5.00 ax. 90° V. 20/xxx.		Recovered after marriage.
	10	F.	1890	R 2.00 + 5.00 ax. 110° V. 20/xl.	School: flance	Recovered. Had two or three re-
10			1892	$R. + 1.25 ax. 90^{\circ} 20/xx.$	died.	lapses.
11	17	F.	1092			Recovered after marriage and childbirth.
12	19	F.		K. — 0.50 ax. 1.05 V. 20/xx.	nation.	Three healthy children living. Suddenly during college examina- tion. Had relapse during sec- ond examination. Has fully
13	34	F.	1902	L. + 0.50 + 0.50 ax. 90° V. 20/xx		recovered. Recovered in two years.
14	29	F.	1903	R. + 0.75 ax. 90° V. 20/xx. L 0.50 V. 20/xxx. R 0.50 V. 20/xxx.		Recovered after marriage two years later; two healthy chil- dren,
15	37	F.	1897	L. + 0.75 R. + 0.75 ax. lx.	Financial wor-	Recovered in three woons En
16	17	F.	1905	L. $-0.75 \pm 4.50 \text{ ax}, 100^{\circ} \text{ V}, 20/\text{zx}$.		larged cystic thyroid persists. Recovered. Tinnitus aurium, progressive deafness, Recovered in one year.
17	16	F.	1902	R0.50 + 4.00 ax. 75° V. 20/xxx. L. +0.75 + 0.25 ax. 90° V. 20/xxx R. +0.75 + 0.25 ax. 90° V. 20/30. L. +1.25 ax. 75° V. 20/xx.	School	Recovered in one year.
18	30	F.	1902	L. + 1.25 ax. 75° V. 20/xx. R. + 0.50 ax. 75° V. 20/xx.		Recovered slowly.
19	18	F.	1892	16. T 0.50 BA. 15 V. 20/ AA.	Broken en- gagement.	Recovered within a year after
20	25	M.				commencing to study medicine. Twin brother of number nineteen
21	53	F.	1898	L 4.00 - 1.00 ax. 180° V. 20/xx.	Worry	(19) much improved. Still has exophthalmus and tachy-
22	21	F.	1900	R. — 4.00 — 0.50 ax. 30° V. 20/xx. L. — 0.75 — 0.25 ax. 9° V. 20/xx R. — 1.00 V. 20/xx.		Still has exophthalmus and tachy- cardia when worried. Recovered. Daughter of twenty- one much improved, but has had several relapses. Teaching
23	37			L. + 9.25 V. 20/xv. R. + 0.25 V. 20/xv.		school every day.
20						
24	25	M.	1904	L. + 4.00 + 2.00 ax. 90° V. 20/xx R. + 4.00 + 3.00 ax. 90° V. 20/xx	ment.	Thyroidectomy; died from operation.
25	12	F.	1904	L. + 1.75 ax. 90° V. 20/xx	School	Recovered in two years.
26	21	M.	1896	$\begin{array}{l} L. + 4.00 + 2.00 \text{ ax. } 90^{\circ} \text{ V. } 20/\text{xx.}. \\ R. + 4.00 + 3.00 \text{ ax. } 90^{\circ} \text{ V. } 20/\text{xx.}, \\ L. + 1.75 \text{ ax. } 90^{\circ} \text{ V. } 20/\text{xx.}. \\ R. + 1.25 \text{ ax. } 90^{\circ} \text{ V. } 20/\text{xx.}. \\ L. + 1.50 \text{ ax. } 90^{\circ} \text{ V. } 20/\text{xx.}. \\ R. + 2.00 \text{ ax. } 90^{\circ} \text{ V. } 20/\text{xx.}. \end{array}$	Civil service examination.	Recovered in one year. Now holds important position in Forestry Department U. S.
27	43				Grief	Exophthalmia so great that lids had to be sutured to protect cornea. Recovered in two years.
28	42	F.	1896	L. + 2,75 V. P. L		Perforating ulcer cornea, right eye. Large ulcer of left Large pieces of edematous conjunc- tiva removed before lids could be closed with sutures. Recov- ered in six months, Good health eleven years. Died from pneu-
29	20	F.	1890		Broken en-	monia.
20	20	F.	1900	L 7.00 - 0.75 ax. 90° V. 20/xx		is now a nurse in good health.
30	20	r.]	L 7.00 - 0.75 ax. 90° V. 20/xx R 7.00 - 1.25 ax. 90° V. 20/xx.		Recovered in eighteen months.

No.	Age.	Sex.	Year.	Refraction.	Exciting Cause.	Remarks.
31	16	F.	1903	L 7.00 V. 20/xx R 7.50 - 0.50 ax. 90° V. 20/xxx.	School exami- nation.	Recovered in few months. One or two relapses, but promptly recovered when taken out of school.
32	57	F.	1906	L. + 1.25 V. 20/xx. R. + 1.00 V. 20/xx.		Serous exophthalmus. Great chemosis; thought would be necessary to close lids with sutures, but was able to protect cornea with adhesive strips. Recovered in six months.
33	40	F.	1901	L. + 1.00 V. 20/xx. R. + 1.00 V. 20/xx.	Marriage un- happy.	Recovered from thyroid enlarge- ment and tachyardia, but still some exophthalmus and tremor.
34	41	M.	1903	L. + 1.50. R. + 1.50.		Thyroidectomy; died.
35	19	F.	1887		Broken engagement.	Ulcer of cornea both eyes. Lids closed with sutures. Confined to bed six months. Recovered and died three years ago from pneumonia.
36	22	F.	1901	L. + 2.50 ax. 75° V. 20/xx. R 0.75 ax. 125° V. 20/xx.		Much improved after marriage. Relapse year ago. Still under observation.
37	24	F.	1901	L. + 0.25 + 0.25 ax. 90° V. 20/xx		Recovered in three years. Tinnitus
38	21			$\begin{array}{l} \mathbf{L}_1 + 0.25 + 0.25 \text{ ax. } 90^{\circ} \text{ V. } 20/\text{xx.}. \\ \mathbf{R}_2 + 0.75 + 0.50 \text{ ax. } 90^{\circ} \text{ V. } 20/\text{xx.}. \\ \mathbf{L}_3 + 0.00 \text{ ax. } 70^{\circ} \text{ V. } 20/\text{xxx.}. \\ \mathbf{R}_3 + 1.00 - 3.25 \text{ ax. } 20^{\circ} \text{ V. } 20/\text{xxx.}. \end{array}$		aurium—progressive deafness. Married six months ago. Great improvement since.
39	19	F.	1894	L. + 0.25 ax. 90° V. 20/xx R. + 0.50 ax. 90° V. 20/xx.	Broken en- gagement.	Improved slowly, but recovered at the end of five years.
40	23			L. + 0.75 ax. 90° V. 20/xx R. + 1.25 ax. 90° V. 20/xx.	School examination.	Recovered. Relapse two years later under school examination. Thyroidectomy. Aphonic since. Exophthalmus still present. Condition otherwise satisfactory.
41	21	F.	1903	L. + 1.00 + 1.00 ax. 105° V. 20/xx. R. + 0.50 + 0.50 V. 20/xx.	nation.	Recovered in two or three years. Happily married.
42	50	M.	1903	L. + 1.50 + 0.50 ax. 90° V. 20/xx, R. + 1.75 + 0.25 ax. 90° V. 20/xx,	Anxiety and loss of sleep	Physician dissuaded from thyroi- dectomy with difficulty. Recov- ered in two or three years.
43	20	F.	1895	L. + 2.25 ax. 90° V. 20/ce R. + 1.25 ax. 90° V. 20/xx.	Broken en- gagement.	Ulcer cornea of left eye. In- serted three sutures outer canthus of left and two in right eye to protect cornea. Still considerable enophthalmus, but general condition satisfac- tory.
44	20	F.		$ m L 1.25 - 0.25 \ ax. 90^{\circ} \ V. 20/xx \ R 1.25 - 1.00 \ ax. 105^{\circ} \ V. 20/xx.$		Thyroidectomy. Died during operation.
45	35	F.	1901	L. + 0.75 + 0.50 ax. 90° V. 20/xx R. + 1.00 + 0.25 ax. 90° V. 20/xx.		Still great exophthalmus, but general condition such that she conducts a large business in a neighboring town. Canthoplasty was made to protect cornea.
46	21	F.	1898	L 1.00 - 0.50 ax. 5° V. 20/xxx R 0.75 - 1.00 ax. 150° V. 20/xxx	Broken en- gagement.	I= -
47	50	F.	1903	L.—		Exophthalmus still present. Condition otherwise satisfactory.
48	40	F.	1904	L. + 1.75 V. 20/xx. R. + 1.50 V. 20/xx.	Financial wor-	Condition much improved. Holds important position as book-keeper.
49	16	M.	1900	L. + 0.50 + 0.50 ax. 140° V. 20/xx R. + 0.50 + 0.75 ax. 30° V. 20/xx.	School	Developed slowly. Recovers when he leaves school, but relapses after three to six months' school work. Has had at least three such relapses.
50	24	M.	190	L. + 0.50 - 1.25 ax. 90° V. 20/xx. R. + 0.25 - 1.25 ax. 90° V. 20/xx.	Employer in sane.	

A number of cases of commencing exophthalmic goiter first consulted me on account of tinnitus aurium.

Errors of Refraction.—I have not attempted to analyze the refractive errors in these cases, but present them for your consideration. The frequency and amount is suggestive of some etiological relation, although too much stress can not be given to these tables. It was because these patients had errors of refraction that I was enabled to keep them under observation for so many years.

Marriage and Childbirth.—My observation that a happy marriage and childbirth has had a very beneficial influence upon the course of the disease is an old one. Gowers has also noted the improvement after marriage and childbirth.

Exciting Causes.—In at least twenty-nine of these cases the exciting cause could be traced to some mental shock, either the stress of school life, broken engagements, financial loss, or worry of some kind. I am sure a larger percentage could be traced to similar causes if attention had been more specifically directed to this etiological factor. According to S. P. Beebe (Jour. A. M. A., Oct. 5, 1907, p. 1157). "There are two commonly accepted possibilities which explain the origin of the hyperactivity of the gland. First, as a result of a nervous shock; second, as a compensatory hypertrophy during a toxemia.

"As to the first possibility, the investigations of the last ten years have given us a fund of information concerning the remarkable control exercised by the nervous system on glandular activity following an apparently insignificant stimulus. We have no direct experimental evidence to indicate in how far we can apply these results to the thyroid gland, but clinically we see many instances of marked change in the activity of the gland following some profound nervous disturbance. The condition may have been latent before and first becomes evident following some severe fright or sudden sorrow. Why the effect should last beyond the stimulus which called it out we do not know. That a new habit of abnormal activity may result from a series of repeated stimuli is an hypothesis put forward to account for many instances of physiologic overwork, and it may apply here."

Prognosis.—Of these fifty cases forty-four are still living—an average of 8.7 years since first recorded. Three died under the surgeon's knife, one died from pneumonia after eleven years, and another after twenty years, one in childbirth twelve years after the disease was first noted. None of them died from the disease or any complication per se. I am fully in accord with the observation of

the older clinicians that the natural tendency of the disease is to recover. Many of these cases, even the most serious ones, have recovered so completely that there is no trace of the disease to be discovered. Others, while they still have a slight exophthalmos, and may have a slightly enlarged thyroid, and perhaps show a slight tremor under excitement, and their nervous system may not be quite so stable as in a person in perfect health, yet they enjoy life, perform all the duties of a good citizen in private and public. They successfully fill their places as artisans, professional or business men or women. They make good homes and raise healthy children, and may be good life insurance risks. I have not had the opportunity of examining exhaustive statistics by writers other than ophthalmologists on this subject, but judging from the statements of various authors there must be considerable guess work-for instance, Posey (Spiller and Posey, p. 844) says "exophthalmic goiter is seldom fatal"; Hare (Practice of Medicine, 1905, p. 760), "a certain number of cases undoubtedly recover, but a certain number are always liable to relapse"; R. W. Wilcox (The Treatment of Disease, 1908) says "the prognosis is usually good as to life, but recovery is rare in patients in whom the disease is well marked and has persisted for a considerable period. Spontaneous cure sometimes takes place in the mild forms. Acute instances of the disease and acute excerbations of the chronic type of the affection may result fatally within a short time; yet patients in whom the attack appeared suddenly and gave evidence of great severity have gone on to recovery within a few days." Gowers (Diseases of the Nervous System, vol. ii, p. 891) says "In few diseases of equal severity and corresponding apparent gravity is the prognosis so uncertain, or do so few cases end fatally under observation." He calls attention to the prognosis being better in private than hospital patients. Dana (Nervous Diseases, 1887, p. 537) says "about one-fifth of the cases get well or practically well. . . . The duration of the disease in recovering cases is from two to eight years."

My observations and the tables herewith submitted lead me to take the more hopeful view and believe that most all of these patients recover, and confirm me in my optimistic prognosis. The severest cases, those with extreme exophthalmos and tachycardia—the ones whom I put to bed and was obliged to resort to canthoplasty—were the ones who recovered most completely and in the shortest time. I have sometimes thought in recent years that at least a part of the benefit claimed for thyroidectomy might be due to the enforced rest in bed.

Remarks.	Recovered when taken out of school.	Recovered in two or three years. Precocious child menstruating.	Tinitus aurium. Progressive deafness. Recovered.	Recovered after marriage and childbirth.	Exopthalmus of left eye only. Recovered from all symptoms	except the exoputations. Recovered after marriage. One healthy boy.	Recovered after marriage. Three healthy children. Died a few	months ago. Fourth childbirth. Recovered in six months.	. Recovered after marriage.	Recovered. Had two or three relapses.	Recovered after marriage and childbirth. Three healthy children	urung. Suddenly during college examination. Had relapse during second examination. Has fully recovered.	. Recovered in two years.	Recovered after marriage; two years later-two healthy children.	Recovered in three years. Enlarged cystic thyroid persists.	Recovered. Tinitus aurium-progressive deafness.	Recovered in one year.	Recovered slowly.	Recovered within a year after commencing to study medicine.	Twin brother of No. 19. Much improved.	Still has exophthalmus and tachycardia when worried.	Recovered. Daughter of No. 21.	Much improved, but has had several relapses. Teaching school	every day. Thyroidectomy. Died from operation.	Recovered in two years.	Recovered in one year. Now holds important position in Forestry Department, U. S.
Exciting Cause.	School.	School.	Broken engagement.	Love affair.			Despondent.	School.		School.	Death of fiance.	School examination.		Grief.	Financial worry.		School.		Broken engagement.		Worry.			Disappointment.	School.	Civil Sevice Exam.
Refraction.	L25 ax. 180 V. 20-20	K	K 1.50 + 3 ax. 100 V. 20-30 L. + .50 + .50 ax. 90 V. 20-20 D + .55 + .50 ax. 105 V. 20-20	L. + .73 + .30 ax. 103 V . 20-20 L.	L	L1. ax. 180 V. 20-20 B75 ay V. 30-15	L. + 3 + .25 ax. V. 20-20 D. + 3 + .25 ax. V. 20-20 D. + 5 + .25 ax. V. 20-20	L. + 2.15 + .25 ax. 90 V . 20-20 L. + 3. + 3. ax. 90 V . 20-40 D. + 5. + 5. ax. 90 V . 20-40	L. + 5. 4x. 90 V. 20-40 L. + 5. 4x. 90 V. 20-40 D 5. 5x. 90 V. 20-40	L 2. + 9. aA. 110 V. 20-40 L. + 1.50 ax. 90 V. 20-20 R. + 1. 95 av. on V. 90-90	11. T 1.60 a.A. 50 V . 60-60	L 50 + 2.50 ax. 90 V. 20-20 R 50 ax. 1.05 V. 20-20	L. + .50 + ax. 90 V. 20-20 R. + .75 ax. 90 V. 20-20	L. — .50 V. 20-30 B. — .50 V. 20-30	L. + .75	L75 + 4.50 ax. 100 V. 20-20 B = 50 + 4 ov 75 V 90-90	L. + .75 + .25 ax. 90 V. 20-30 B. + .25 ax. 00 V. 30-30	L. + 1.25 ax. 75 V. 20-20 B. + 50 ax. 75 V. 90-30	00000 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		L41. ax. 180 V. 20-20 B -4 - 50 oy 90 V 90-90	L 75 - 25 ax. 90 V. 20-20	I. + .25 V. 20-15	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	L. + 1.75 ax. 90 V. 20-20 B. + 1.95 av. 90 V. 90-30	L. +1.50 ax. 90 V. 20-20 R. + 2, ax. 90 V. 20-20
Year.	1900	1900	1901	1885	1895	1905	1896	1905	1895	1899	1892	1889	2061	1903	1897	1905	1902	1905	1892	:	1898	1900	1902	1904	1904	1896
Sex.	Ħ	E.	H	Ħ	M.	<u>F</u>	E.	E.	E-	E.	H	E 6	· 1	표.	표.	E.	표	표.	E.	M.	E.	F.	H.	M.	<u>F</u>	M.
Age.	19	10	30	22	42	50	18	17	23	10	17	19	34	27	37	17	16	30	18	25	53	21	37	25	12	21
No.	Н	cs.	ಣ	41	10	9	7	00	6	10	Ħ	12	13	14	15	16	17	18	10	30	21	22	23	24	22	56

Remarks.	Exophthalmus so great that lids had to be sutured to protect	Performing ulear, cornen, property learner of left. Large pieces of edematous conjunctiva removed before lids could be closed with sutures. Recovered in six months. Good health,	Reported dend. Subsequently learned she had recovered and is	Recovered in eighteen months.	Recovered in few months. One or two relapses, but promptly	Severe exophiliations. Great chemosts. Thought it would be necessarily to close lide with sutures, but was able to protect cornen	Recovered from thyroid enlargement and tachyardia, but still some example the second through the second the second through the	Thyrofdeefomy. Dled.	Uleer of cornen, both eyes. Lids closed with sutures; confined to	Much Improved after marringe. Relapse year ago. Still under freatment.	Recovered in three years. Thittus aurium-progressive deafness.	Married six months ago. Great improvement.	Improved slowly, but recovered at the end of five years.	Recovefed. Relapse two years later under school examination. Thyroidectomy appoint since. Exophthalmus still present. Con-	gerovered in two or three years. Happily married.	of Physician dissunded from thyroidectomy with difficulty. Recov-	ered in two or infectives. Unserted three sutures: outer counting of lifer and two in right eye to protect corner. Still considerable or covered the literature of the contract of the contrac	Thyroddectomy. Died durling operation.	conducts a large business in a neighboring town. Canthoplasty	was made to protect corner. Recovered after marriage. Two children.	. Exophthalmus still present. Condition otherwise satisfactory.	Condition much Improved. Holds important position as book-	Developed slowly. Recovered when he leaves school, but relapses after three to six months' school work. Has had at least three	Rich rempies. Recovered, while employer was sent to institution.
Exciting Cause.	Grief.		Broken engagement.		School examination.		Marringe unhappy.		Broken engagement.			Worry.	Broken engagement.	School examination.	School examination.	r and loss	Broken engagement.			Broken engagement.		Financial worry.	School.	Employer Insane.
Refraction.		2.75 V. P. V. 20-40		L 7 75 ax. 90 V. 20-20			L. + 1. V. 20-20			L. + 2.50 ax. 7 V. 30-30		L. + 3. 8x 7. 70 V 20-30		02	L. + 1. + 1. ax. 105 V. 20-20		I. + 1.79 + 25.1X : W V : 20-20 I. + 2.25 nx. 90 V : 20-200 R + 1.25 ax. 90 V : 20-20	L 1.2525 nx. 90 V. 20-20	I. + .75 + .50 nx. 00 V. 20-20	L. + I. + 1.50 ax. 50 V. 20-20 D I 1.50 ax. 5 V. 20-30		L. + 1.75 V. 20-20 D. + 1.75 V. 20-20		L. + .50 - 1.25 ax. 90 V. 20-20 B. R. + .25 - 1.25 ax. 90 V. 20-20
Year.	1804	1806	1890	1900	1903	1906	1001	1903	1880	1901	1901	1905	1894	1908	1903	1903	1805	1903	1901	1808	1903	1904	1000	1900
Sex.	F.	4	F.	F.	F.	2	F.	M.	F.	-	F4	4	F.	M.	F.	M.	E.	E.	F.	F.	E.	<u>17-</u>	M.	M.
Age.	2	23	30	50	16	22	40	11	10	55	53	21	10	65	21	90	50	20	35	21	99	40	16	24
No.	27	288	20	98	31	26	555	50	35	36	37	25	30	40	4	7	\$	4.4	45	16	47	48	49	20

Treatment.—Although there is no specific treatment for these cases, yet there is much that can be done for them. During the acute stage, rest, mental and physical, is of the utmost importance. Hydrotherapy has proved of the greatest service. Phosphate of soda has been prescribed as routine practice for twenty years. I have found the faradic current of benefit in reducing exophthalmos. When dilatation of the heart is present strophanthus has served me better than digitalis. Special indications were met as they arose: iron for anemas, quinin and arsenic for indigestion, and bichlorid for intestinal antisepsis. Errors of refraction are fully corrected. Marriage and childbirth encouraged. Many times I have been the buffer between wretched children and an exacting teacher, or a stern parent. I have been father confessor, and have helped to reunite fractured hearts with the most happy results. As I look back over my professional life I can number many of my best friends among my patients who formerly suffered from Graves' disease, and many of the happiest homes I know are presided over by my former exophthalmic patients. The truest and best physician is not the one who prescribes for the physical ills alone of his patient, but for the mental ones as well, and no one can successfully treat exophthalmic goiter who is not more friend and counsellor than one who wields the knife or prescribes pellets.

DISCUSSION.

DR. KIRKENDALL:—We have a doctor in my city who is operating four or five cases per week, and I should like the doctor to write Dr. Tinker and get his results. He has had several deaths. He does two or three thyroidectomics a week. He does the operation with local anesthesia and he does it very successfully. He is a skilled operator and he has good results, and I am inclined to believe he is doing it successfully and it is possible we might learn a great deal from these results.

Dr. Vail:-I would ask Dr. Baker a question regarding the etiology. Judging from the interesting table which is passed around, I would judge he regards overstudy, disappointment in love, shock, etc., as exciting causes for acute exophthalmic goitre. I would inquire what he thinks is the remote cause of the trouble. A theory was promulgated to me in a private conversation with Dr. Baker a short time ago as to the discovery of the cause of goitre among the sheep raised in northern Michigan. I was told that in the Northern Peninsula a few years ago it was impossible to raise sheep on account of goitre, while in the southern part they thrived and were free from the disease. It was discovered by some sheep raiser that the salt that was used for the sheep in the north was from one part (I believe from Milwaukee), while that used in the southern part usually came from another (Detroit). It was found on examination that the salt which was fed to the sheep in the north was entirely devoid of iodin, while that from the other point contained the normal amount. Sheep raisers acting upon this suggestion used the iodin containing salt, and were able to raise sheep as well in the north as were raised in the south. The question now arises, whether the lack of a sufficient amount of iodin salts in the physiological chemistry of the human body would act as a predisposing cause.

DR. FRANCIS:—Has Dr. Baker seen cases of papillitis associated with exophthalmic goiter? I ask because on the medical service at the Buffalo General Hospital I saw a case of exophthalmic goitre which presented very marked papillitis in both eyes. All other causes of swollen disc had been carefully eliminated.

Dr. Baker (closing):—In reply to Dr. Francis, I would say that I have never seen papillitis in a case of exophthalmic goitre. I think his was one of coincidence.

There is a distinction between exophthalmic goitre and the ordinary every day goitre which some of those participating in the discussion seem to have confused.

In this lake region we have a goitre zone. They tell us in the Cleveland laboratories that nearly every tramp dog has goitre. There are more cases of goitre here than in other parts; but whether that is true of exophthalmic goitre I can not say. Whether there is any pathological relation between ordinary goitre and exophthalmic goitre I do not know. I have seen two or three cases of exophthalmic goitre in patients previously suffering from cystic goitre. It may be merely a coincidence.

Dr. Marine, who is connected with the Western Reserve University, has made a most interesting study of goitre affecting the sheep in Michigan. I think his paper has already been published.

It has been known for some years that in some parts of Michigan sheep can not be raised. In other parts it is a sheep raising country. It was discovered that farmers who bought salt at Detroit could raise sheep and those who bought it at Saginaw could not; one containing iodin and the other not.

In looking up the literature of exophthalmic goitre I saw edema of the lids mentioned; some in which the entire eyeball was dislocated, but in no case did I see mentioned a condition which I found in three of these cases here reported. In all of them there was the most extreme chemosis I have ever seen, not even in cases of panophthalmitis. In order to bring the lids together to protect the cornea I was obliged to dissect out large pieces of edematous conjunctiva as big as my thumb. In one case the cornea had already perforated from ulcer, but in that case, as in the other two, the patients made a rapid and complete recovery.

SOME FACTS CONCERNING FAMILY EXOPHORIA.

BEING A PRELIMINARY CONTRIBUTION TO A STUDY OF THE RELATION
OF CRANIAL BUILD AND ORBITAL FORMATION TO THE
STATUS OF THE EXTRINSIC OCULAR MUSCLES.

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Professor of Diseases of the Eye in the Medical Department of Temple University.

The question as to what influence heredity may play in the production of esophoria, exophoria and hyperphoria has, so far as the writer's knowledge goes, not yet been investigated. With the continued increase of interest in all problems relating to the ocular muscles, it seems that the time has come when this phase of exophoria should be included among such studies.

That intrinsic exophoria (and also intrinsic hyperphoria) have a tendency to appear in more than one member of a family, is a sentiment that the writer has harbored for some years past. This sentiment was partly emphasized by a study of two and sometimes three generations of families in which it was claimed that headaches and neuralgia were hereditary. It was found in several instances that individual cranial peculiarities marked those particular members of such families who had had "the same kind of headache or neuralgia as their mothers or fathers," or uncles or aunts had had before them. They seemed to look upon it as an inheritance for which it was a waste of time to seek relief.

Now if there is one fact in ophthalmology more striking than any other, it is the persistent fashion in which Nature in some families hands down from generation to generation a certain type of defective eye or eyes. One of the commonest examples is the way astigmatism will be passed on in degree and axis, from parent to child. When we remember that this means a reproduction in the child of the curvature of the parent's cornea, even to a fraction of a millimeter, we shall be duly impressed with the far-reaching results of the influence of heredity. If such can be the close adherence to the law of heredity in so delicate a matter as corneal curves, how much more likely is it to show forth in the balance or imbalance of the external ocular muscles. That such balance or imbalance is to a certain extent influenced by the cranial conformation and orbital build, is to-day practically an accepted fact. Risley, in 1895, contended that "it is highly probable that the defective

form of the eyeball which produces the ametropia, and the faulty attachment of the muscles of the globe which causes the ocular imbalance, are the direct result of the defects in the shape of the bony orbit and this in turn is due to distortion of the skull. It follows, therefore, that the possibility of hereditary anatomical malformation should be excluded in every case before accepting the theory of hereditary headache." Two years later Stevens brought forward his hypothesis (Archives of Ophthalmology). Knapp, 1897, "that according as individuals are long skulled (dolichocephalic), medium skulled (mesocephalic), or broad skulled (brachycephalic) there will be certain corresponding position of the visual axes."

About two years ago it occurred to the writer that the diagrams used by hatters might be profitably used in such a study as the foregoing, and he began sending members of families in whom there were two or more exophories, to the hatter for a "conform," as it is called by those in the hat trade. These diagrams represent fairly well the anteroposterior and the interparietal (transverse) diameters of the skull just a trifle less in both diameters than they actually are, because the hatter wants a diagram of the head where the inside rim of the hat is to rest, just barely above the longest and broadest diameters of the head of the wearer. So that the relative proportion between the anteroposterior and interparietal diameters, as represented by these hatters' diagrams (or conforms) is very close to the actual anatomic relations. Moreover, they represent the transverse plans of the cranium at approximately its broadest point, in much more graphic fashion than it can be mapped out from measurements with a craniometrist's calipers.

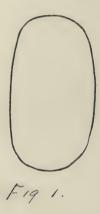
In the female members of these exophoric families, the use of the "conformateur" (as the device is called by which the conforms are secured) is not feasible, because of the fact that unless the hair is taken down and allowed to fall loose while the measurement is being made, there would be introduced too many complications, such as combs, uneven masses of hair, etc. In these cases, therefore, an ordinary large mechanic's calipers were used and the two diameters registered.

Craniologists classify skulls accordingly as they are dolichocephalic (long heads), mesocephalic (medium heads), and brachycephalic (broad heads). The cephalic index is obtained by multiplying the transverse diameter by 100 and dividing by the anteroposterior diameter. For instance, if the anteroposterior diameter,

as in one of my patients, is 73% inches and the transverse diameter 53% inch, the cephalic index is 72.88. In the diagram shown in Figure 1 the cephalic index is 70.

Topinard arranges skulls with a cephalic index less than 77.77 as long ones, those with an index from 77.78 to 83.34 as medium heads, and all above 83.34 as broad heads. On this basis the great majority of the heads measured in this study fall in the long-skulled class.

As a control factor, 20 conforms were secured from a hatter, which represents the heads of 20 men who had been consecutively measured as they came into the hatter's store. In other words, they represent 20 heads measured without any idea as to what



form of skull or what state of muscle imbalance they represented. These diagrams are shown in plate No. 1, and with them may be contrasted those shown in plate No. 2.

From my recent records I find several families that show a greater or less exophoric tendency. Doubtless there are many others in my records did time offer to investigate the side lines. Indeed, many exophorics belong to exophoric families, only the muscle status does not interest the ophthalmic surgeon sufficiently to impel him to carry his investigations that far. In none of the families inquired into were more than two generations involved.

In Family No. 1 there were seven members, one of whom was esophoric and six exophoric. The four exophoric members whose heads were measured were all shown to have long (dolichocephalic) heads. Their cephalic indices were 66, 62, 73 and 66. Table No. 1.

In Family No. 2 there were five members, of whom one was orthophoric with a cephalic index of 79. The other four were all exophoric and all showed dolichocephalic (long) heads, their cephalic indices being 68, 65, 70 and 77. Table No. 1.

In Family No. 3 there were fifteen members, counting cousins. Of this number ten were examined. Two were found to be esophoric (with cephalic indices of 76 and 79), eight were shown to be exophoric and of this eight, four were long skulled, two were medium skulled and two were not measured. Table No. 1.

In Family No. 4 there were four members, all of whom were exophoric, one only of whom submitted to head measurement. This case showed a cephalic index of 68 and falls in the class of long heads. Table No. 1.

In Family No. 5, comprising ten members, but five were examined. One of these was esophoric and the remaining four exophoric. Of these four, the two that submitted to head measurements were typically long skulled. Table No. 1.

In Family No. 6, numbering nine members, six were examined. Of these six, one was esophoric (the mother) and all of the five children were exophoric in greater or less degree. Only one of these presented for head measurement and was typically long skulled. Cephalic index, 71. Table No. 1.

In Family No. 7, embracing six members, but three (all brothers) were examined. All of these showed both exophoria and dolichocephalus (long skull), their indices being 60, 62, and 60. Table No. 1.

To sum up, seven families, comprising fifty-six members, were investigated, and of these forty were personally examined by the writer. One was orthophoric, five were esophoric and thirty-four of the forty were exophoric.

Of the thirty-four exophorics, twenty-one submitted to head measurements, and of this latter number eighteen were long skulled and three were medium skulled (or mesocephalic). If this proportion were to anywhere near hold out in a large number of cases it would rather indicate that dolichocephalus (or long skulledness) predisposes to exophoria.

Whether brachycephalus (broad skull) and mesocephalus (medium skull) have their associated state of muscle balance is not

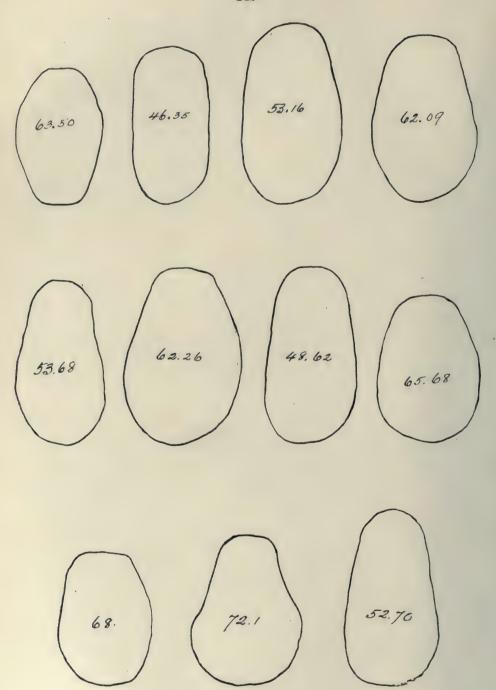
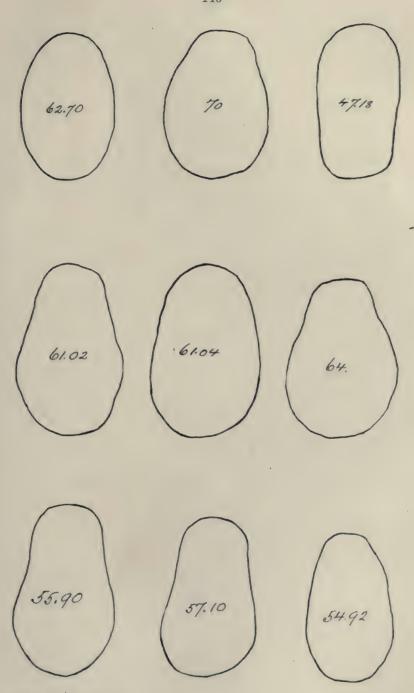


PLATE I. Twenty Miscellaneous Heads from



a Hatter's Record Books Taken Consecutively.

known. This is as far as the writer, at the present writing, is willing to go in endeavoring to form any conclusion issuing from the study just submitted."*

FAMILY No. 1.

Name. L. H	25 30 60	Refraction. H and A H H and A H H and A H	Esophor.	Ta Sa Exophor.	1 8 0 5 Exo. at 13 inches.	b. b. Convergence near point in inches.	o. Prism Divergence.	::: Right Hyperphor.	Left Hyperphor.	Anaphoria.	T: T: Character of Head.	5: 9: Cephalic Index Conf.	: : : Cephalic Index Callp.
Miss H C. H	40	Hand AH		6	12 12	2 3	i.				L	75 66	
J. J. H		Hand AH	4	٠.									
Е. Ј	9	Hand AH	FAM	11LY 2	No.	2 1/2					Y	68	
C. E. J E. J	37 11 16	H and A H H and A H H and A H H and A H	0	8 15 0 8	13 12 0 13	31/2				• • • • • • • • • • • • • • • • • • • •	L L M L	50 60 	68 78 77
			FAM	ILY	No.	3.							
Mrs. K. Miss G. K. G. K. H. F. K. H. F. K. Miss K. Miss K. H. H. K. Miss K. Miss K. Miss K.	25	A M A H M H and A H H and A H H and A H H and A H A H A H A H	· · · · · · · · · · · · · · · · · · ·	14 3 2 1 2 1 3 5	18 3 10 12 15 0 0 5 10	5 3 1/2 2 2 2 2 3	10		4		L L L M M M	60 50 69	77 71 75 82 82 80
			FAM	IILY	No.	4.							
Mrs. L S. L E. L J. L	47 25 22 19	Hand AH Hand AH Hand AH AH M		$\begin{array}{c} 1\\10\\2\\5\end{array}$	$6 \\ 14 \\ 10 \\ 15$	3 4½ 4 5	8 10 5 8	• • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • • • •		• • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • • • •	
			FAM			5.							
Mrs. M Miss M Mrs. E Mrs. J Jno. M		H and A H		10 10 6	6 14 15 8	2 ½ 5 4	8 10 		•••		L 		73 73
T 37	00	II A Emp II	FAM			6.							
L. N. S. N. H. N. H. N. L. N.	22 24 14 19 25 60	H and A H A H M	· · · · · · · · · · · · · · · · · · ·	12 2 1 2	20 8 4 3 5	53333	··· ··· ···	:: :i	i ¼		`L	71 	
			FAM	ILY	No.	7.							
G. M J. M H. M	23 17 25	H and A H H and A H H and A H	• • • • • • • • • • • • • • • • • • • •	$\begin{array}{c} 12 \\ 1 \\ 2 \end{array}$	18 10 5	3 4 5	13 10 10	• •	• •	• • • • • • • • • • • • • • • • • • • •	L L L	66 62 60	80 78 77

^{*}The essayist is now engaged in following out a large number of such cases, in the hope that more definite facts may be brought forward for consideration.

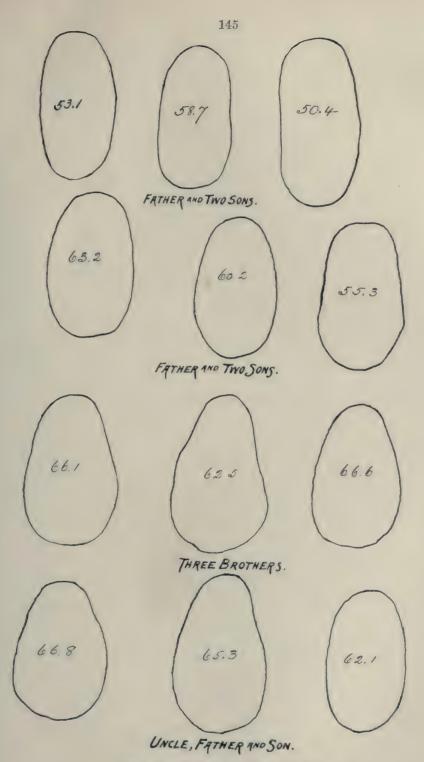


PLATE II. Twelve Heads-all Exophories.

There are two other facts that stand out prominently in this The first is that out of the thirty-four exophorics examined. twenty-seven (80 per cent.) showed H + Ah, or its allied refractive conditions; three (9 per cent.) showed M & Am and its allied refractive conditions, and four (11 per cent.) showed mixed astigmatism. These figures fall fairly close to those the writer presented to the Section on Ophthalmology at the Boston meeting of the American Medical Association in an analysis of 441 cases of exophoria. In that study 73 per cent. of the whole number of exophorics presented H + Ah, or its allied refractive conditions. The idea, therefore (largely continental), that exophoria is mainly innervational and usually associated with myopia and its allied refractive conditions, will have to be laid aside. The one the writer believes to be much nearer the truth is, that all states of muscular imbalance are the result of two factors: (a) the anatomic build of the orbit, and (b) the innervational state of the muscles.

That the innervation varies in different individuals—and even in the same individual at various times-goes almost without saying. The anatomic feature is one that has not been worked out as it deserves. Emmert (1c) and Danziger have both made notable contributions to this phase of the subject. Weiss (Knapp's Archives, vol. xxxv) has summed the matter up by his statement that "the effectiveness of a muscle depends in general upon (1) its size, (2) its quality and (3) its insertion. In the case of the extrinsic ocular muscles, other factors than these three have to be considered, the main one being the direction of the muscle cone. This in turn is dependent upon the degree of divergence of the orbits, its depth, and the shape of the eveball." To this the writer would add the conformation of the skull as influencing the build of the orbit. "All these factors determine the size of the Contact Arc of the ocular muscles. The significance which the size of this contact are has in determining the amount of movement imparted to the eve is well known."

It was in the belief that peculiarity of cranial build might have much to do with orbital dimensions and hence with the direction of the visual axes, that this study was undertaken; and the writer has a feeling that further exploration of the subject will crystallize this feeling into a conviction. No one realizes more than he how tentative are the facts hereinabove submitted, and that they are a mere scratch on the surface of the immense study that lies just beyond. He hopes within a year to bring forth a larger array of facts touching, not only family cranial peculiarities, but also the relation of cranial and orbital formation to the muscle status in general.

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DISCUSSION.

DR. VALK:-I hope that some day this society will take up one of the questions Dr. Reber has spoken of here, and that is whether heterophoria is innervational or anatomical. I should like to know what it is. Another interesting thing is the heredity of the condition of hetero-I believe it is hereditary. I saw a little boy some time ago who illustrates the subject beautifully. He was brought to my office by his mother, with a perfectly round posterior polar cataract. I asked to examine the mother's eye, and I found the same condition in her eye, in the same position and on the same side. It seems surprising such a thing could pass down from mother to child. If we can inherit this long skull, as Dr. Reber claims, why not also other anatomical peculiarities and the size, shape and innervation of the ocular muscles? I can not see why we can not pass down these conditions from mother to child as well the shape of the orbit. I can not accept this theory with reference to the axis of the Both inner planes are almost parallel, and I believe that the axis of the orbit has no influence on the position of the visual line. Again, I believe that the motility of the eye is controlled by a certain standard of motion, and I think that we must adopt a standard of motion just as we have a standard of vision. You expect your patients to have 20/15 vision. Why not say they shall turn their eyes to right and left and up and down to a certain degree? Then if the eye deviate from this standard you can find your condition of heterophoria.

Dr. Lucien Howe:—After having our ideas of the ocular muscles in a chaotic condition for a long time, we are beginning apparently to feel our way out of the darkness. And the way is not by theorizing, but by collecting the facts. Such statistics as these, for example, are of use as to one point, and I am glad to have the facts he has given us.

Dr. Schneideman:—Dr. Reber is no doubt familiar with work done by Ask in support of Stilling's hypothesis as to the shape of the skull in myopia. It appears that these measurements might throw some light upon the question he has raised, and we are all obliged to him for bringing it out in the way he has done.

DR. Reber (closing):—As to the insertion of the muscles and the possible hereditary transmission of a peculiarity of insertion, unfortunately we know nothing. Reference is made to this in Dr. Howe's book and is emphasized as well worth investigating. I admit I attacked the thing easier of investigation; the other is much more difficult, but should be followed out. The question raised by Dr. Schneideman in regard to Ask's work refers more to craniums, and I prefer to say little about that until I have had an opportunity to go over the 1,200 skulls in the Academy of Natural Science in Philadelphia, when I hope to have something to say about craniums that have been deprived of their coverings. The opportunity offered to make some investigations on the living subjects as they present themselves in our offices and the paper submitted is the result.

METASTATIC CARCINOMA OF THE CHORIOID—A CRITICAL STUDY WITH CASE REPORT.

GEORGE F. SUKER, M.D., AND LORENZO N. GROSVENOR, M.D. CHICAGO.

Metastatic carcinoma of the chorioid is of such clinical rarity as to warrant the citation of any additional authentic cases. In order not to depreciate the value of statistical reports on this subject, but rather to enhance their value, we have taken as a basis for the study the statistics compiled by Marshall, Parsons and Oatman; and we have added to these lists all the authentic cases since reported in literature and, in addition, those which were overlooked by these three writers, as well as adding one from our own service.

Marshall carefully reported all cases up to 1897, being 24 in number. Parsons takes up the search from that date up to 1903, adding 9 additional cases, including his own. Oatman's article. which appeared in March, 1903, added 4 new cases (one of these being his own) to Parson's list. In our careful research we have succeeded in finding 27 additional cases including our own. The majority of these cases have been reported since 1903; however, some few had been overlooked by both Parsons and Oatman. Of these 27 cases, 7 were reported prior to and 20 since Oatman's and Parson's articles appeared in 1903. There is no doubt but that these three articles stimulated the reporting of subsequent cases, for a total of 20 cases have been reported since 1903, while only 24 cases were recorded between 1872 (first case) and 1897, when Marshall's last case was published. It seems reasonable to suppose that there are quite a few more cases unrecorded, particularly when we consider a remark of Dr. Alt's: "I have examined several cases of metastatic chorioidal carcinoma, but they were not my cases" (personal communication, July, 1908).

It is not the purport of this study to theorize as to the etiology of carcinoma or offer any definite views on the various mooted questions which are at present engaging the thoughts of pathologists.1 Our studies, furthermore, are based exclusively on intraocular carcinoma and its clinical differentiation from sarcoma. We have even restricted ourselves more specifically in so far that we only considered such carcinoma and sarcoma as are either metastatic or primary within the chorioid. We do not consider any reference to or cases of these malignant growths, either primary or secondary, in the iris and ciliary bodies. However, it may be stated that several cases are recorded of primary carcinomatous metastases in the ciliary body and iris.2 These two structures are not uncommonly involved, however, only by direct extension or tertiary metastasis from the chorioidal carcinoma.3

GENERAL CONSIDERATION.

In an analytical study of endo-ocular tumors, irrespective of their specific nature—whether primary or metastatic—one is forcibly struck with the paucity of endo-ocular carcinoma. A primary carcinoma of the endo-ocular tunics has up to the present day never been seen or reported;4 this for the reason that within the globe there are no histologic cells in which a carcinoma per se could engender. Therefore, any carcinomatous involvement of intraocular tunics must be a metastasis. Per contra a metastatic intra-ocular sarcoma is just as rare as a primary carcinoma. The case or two of the former reported in literature bearing on either of these two latter points are open to serious objections in each

^{1.} A view of the origin of carcinoma which is gaining credence is that of Ribbert's (Deutsch. med, Wchnshr., No. 31, 1905) that carcinoma originates in epithelial cells over which the body has lost control; the cells proliferate independently and at the expense of the body. He has demonstrated changes in subcutaneous tissue or vessels from local arteriosclerosis markedly inhibiting blood supply and finally shutting off the epithelium above from the direct control of the rest of the body. Roentgen cancers are a good example of this type, the infiltration of the subcutaneous tissue and papillary layer of the corium occluding the capillaries and gradually shutting off the epithelium from the blood supply. As long as the body is capable of responding with the new vessel formation and capillary growth the epithelium is not entailed, but as age advances, this property is lost and the epithelial cells gradually become excluded from the rest of the body. Epithelial cells have a peculiar power of independent existence, more so than any other kind of cells, witness detached epithelial grafts. Wyss (Deutsch. Ztschr. f. Chirurgie, July, 1903, No. 6, pp. 505-587) upholds the same view.

grafts. Wyss (Deutsch. Ztschr. f. Chirurgie, July, 1903, No. 6, pp. 505-587) upholds the same view.

2. A reasearch of the literature reveals the following cases:
Badal and LaGrange: Arch. d'Ophtal., March, 1892, vol. 12, p. 3;
Trencher Collins: Trs. Oph. Soc. U. K., 1894, vol. 14; Brewitt: Arch. d'Ophtal., 1896, vol. 18, p. 30; Briehn: Dissert. Königsberg, 1902; Uhthoff: Deutsch. med. Wchnschr., 1904, No. 39; Cutler: Trs. Am. Oph. Soc., May, 1905, vol. 10; Stock: Klin. Monats. Augenhk., 1905; Proctor and Verhoeff: Arch. Oph., January, 1907.

3. Cases in our list which show ciliary body and iris involvement either by direct extension, continuity or invasion: Numbers 12, Ewing; 20, Abelsdorf; 30, LaGrange; 31, LaGrange; 32, Rockliffe; 36, Bentzon; 38, Chevallereau; 44, Brewitt; 55, Oeller: 57, Kowalewski; 59, Uhthoff: 63, Leber.

4. Primary carcinoma of the brain, with chorioidal metastasis has never been recorded; although in several carcinomata of the brain, choked disc supervened as in any other brain tumor. In 17 of our cases there were metastatic foci in the brain.

foci in the brain.

C. D. MARSHALL'S LIST OF CASES OF METASTATIC CARCINOMA OF THE CHORIOID. Royal London Ophthalmic Hospital Reports, Dec., 1897, vol. xiv, p. 415, 24 eases.

No. of Case.	Author.	here Published.	Sex.	Age.	R. — L. Eye.	Tension of Globe.	Pathological Examination of Byeball.	Seat of Primary Growth.	Secondary Deposits Other Than Eye.	Duration of Life After First Eye Symptoms.
-	Perls, M	Virchow's Archiv, 1872, Bd.	M.	43 E	R. and L.		Nodular flat tumor in both chorioids, Right lung,	Right lung,	Liver, brain, etc	1 month.
23	Hirschberg, J	Centralbl. f. prak. Augenheil-	E	52 F	R. and L.	Th	K. ret. detached.	Right breast.	ζΩ.	7 months.
က	Schoeler and Uhthoff. (1)	Schoeler and Centralbi. f. prat. Jugenheil- Uhthoff. (1) kunde, 1883, S. 236.	E.	33 F	3. and L.	R. T. + 1	d retina,	Left breast 6 years.	Both ovaries, brain, dura and	13 months.
4	Hirschberg and Birnbacher.	and Graefe's Archiv f. Ophth., br. 1884, Bd. 30, Ab. 4, S. 113.	Œ.	28 I	L	T 1	L. about disc and macula. Detached and invaded retina. Flat tumor of chorioid.	east,		2 months.
20	Manz. W.	Graefe's Archiv f. Ophth.,	Ē	50 E	3. and L.	:	Detached retina, Clinical only	Right breast, Abdominal	kidneys. Abdominal	2½ months.
9	Schapringer, A	1065, Dat. 91, AD. 4, S. 191.	Fi	1 Ic	L	Tn. 1.	Edema papilla, flat tumor in macu- Right breast, Lungs, liver and r. 4 months.	Right breast,	Lungs, liver and r.	4 months.
F-	Mitvalsky, J., 1st	Mitvalsky, J., 1st., Archiv f. Augenhk., 1889, Bd.	Ē	46 L	Ľ	T. + 2	lar area. Flat cystic tumor. From optic disc to Left breast,	Left breast,	temporal bone. Brain and lungs	31/2 months.
00	Mitvalsky, J., 2d Ibiden	Ibidem.	M.	35 I	L	Tn	ry body. Glaucoma.	Clini- Left breast, Brain	Brain	2 months.
6	Gayet	Archiv d'Oph., 1889, p. 205	M.	30 F	R	T. + 3	ů,	Stomach	lungs	and "Veryshort
10		Archiv f. Augenhk., 1893, Bd. 27, S. 46.	M.	37 E	R	T. +	cord adenocarcinoma of chorioid. Detached retina. Glaucoma. Flatt nodular adenocarcinoma chorioid.	Stomach	Irver. Brain	time."
11	Schultze, S., 1st Archiv	Archiv f. Augenhk., 1890, Bd.	Fi	34 I	Ľ	Tn	Optic nerve invaded. Detached retina; 2. flat tumors in Right breast, Medulla oblon-4 months.	Right breast,	Medulla oblon-	4 months.
12	Ewing, A. E	Graefe's Archiv f. Ophth 1890, Bd. 36, Ab. 1, S. 120.	F	32 H	R. and L. R. T.	++	chortoid. Also epibulbar deposit. 1 year. gata. R. Tumor about O. N. forward into Left breast Abdominal ciliary body and iris. Detached gans.	l year. Left breast		or- 12 months.
13	Guende, C	Guende, C Recueil d'Oph., 1890, S. 325.	E	24 I	R	 !	Cyclitis. Flat gray tumor chorioid. Right breast Clinical only.		Skull, sternum, ribs, fingers, liver, langs, heart.	sternum, Observed 3 ngers, liv. "Died gs, heart. "Died
14	Elschnig, A	Elschnig, A Archiv f. Augenbk., 1890, Bd.	E.	57 I	L	T +	Detached retina, Glaucoma, Flut Left breast, Brain,	Left breast,	Brain, lungs and 4 months.	4 months.
15	Wadsworth, O. F.	Wadsworth, O. F. Trs. Ans. Oph. Soc., 1890, vol.	5	46 F	R		tumor about optic disc. Flat tumor in the macular area	Rigat breast,	liver.	12 months
16	Uhthoff (2)	Internat. Beitr. zur wiseen- schaftlichen Medicin, 1891, Rd 9	E	47	47 R. and L. R. Tn.	::	Flat tumor in the chorioid and sclera of both eyes. Retrobulbar deposit.	Right breast, 9 months.	R. temporal lobe, 11/2 months.	or more.

roin. or-7 months. 4 months. 11 months. s or-5 months. cor-5 months.	14 months. 4 months. 2 months. 9 months.
Glands of neck, axilla and groin. Abdominal organs. Abdominal organs. Kans.	ars. Lungs, pleura and 14 month orbit. s. Christian, cervical. 4 months. chycicular and axillary glands. axillary glands. 18. Cervical glands. Cervical glands. 2 months. Pleura, left leg 9 months.
Clinical his- tory lost." Light Imag. Abc G months. Lyear. Lyear. Light breast. hyroid. "I'months. I'months.	1903. p. 86. Adds 9 cases. cullar Breast, 2 years. Lungs, pleura and 14 months. orbit. Left breast, Grugs, pleura and 14 months. Thouths. Chycleular and chycleular chycleul
id; 2 mm. L. Epibulbar "C sleral tum- R iris, optic lat tumor R ma in the TI stic nerve r chorioid. R	letteched retina. Extraeeular Breast, 2 years. Lungs, pleura and 14 months. growth. Flut tumor inmacular area. Clinical only Clinical only Clinical only Cardinana. Hodgkin's discretarinal discretarina discretarina discretarina discretarina discretari
Int tumor in the chorico thick. Clinical only. Int tumor in choricid. deposit. deteched retina. Extra setached retina. Entire and into ciliary body, nerve and selera. Thin, factoricid. In the choricid. In the choricid. In wasion of and selera. Thin, fatt trongh adenocarcino and selera. Thin, fatt trongh adenocarcino and selera. In the posteriol and selera. In the posteriol and selera. In the posteriol Invasion optic nerve. Invasion optic nerve. Invasion optic nerve. Clinical only.	nal Reports, vol. xv. Jan., 1903, p. Retached retina. Extraocular growth, Flut tumor chorioid, flat tumor in macular area. Clinical only Entra cercinoma. Bistractional cercinoma. Glaucoma. Discatched retina. Glaucoma. Discatched retina. Glaucoma. Discatched retina. Rorioid. Also in iris and area chorioid. Also in iris and selent erowth. Invasion of ciliary body. Optic neartits. Intra chorioidal. also cultar growth. Invasion of ciliary body. Optic neartits. Intra chorioidal. also ciliary body.
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M. 55 F.	F. 48 F. F. 46 F. F. 48 F. 46 F. 48 F. 48 F. 46
Wagner, C. Ueber Metustatische Ader- M. 45 L. T. + hauttamor, by S. Schroeter, L. Halle, 1891, est. Holden, W. A., 184, Arflinges of Ophth, 1893, Bd. Schultze, S., 2d. P. 76, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20	25 Samelsohn Deutsch mad Woch, xvii, F. 43 L. Patached retina. Bx tra ocular Breas growth, Flut tumor in macular area. 26 de Schweinitz Trs. Am. Oph. Soc., 1898, p. F. 40 R. Tn. Flat tumor in macular area. 27 de Schweinitz Trs. Am. Oph. Soc., 1898, p. F. 40 R. Tn. Flat tumor in macular area. 28 deo, E., 1st. Trs. Oph. Soc., U. K. xix. 1899 M. 55 L. Tn. Clinical only. Detached retina. Glaucoma. Dis. Lung p. 103. 27 de Schweinitz Trs. Oph. Soc., U. K. xix. 1899 M. 55 L. Tn. Detached retina. Glaucoma. Dis. Lung p. 103. 28 Rowan, J. Trs. Oph. Soc., U. K. xix. 1899 M. B. Tr. + 1. Detached retina. Tumor in temporal Breas area chorioid. Also in iris and p. 30. 29 Rowan, J. H. R. Archiv d'Ophtal., xviii, 1898, F. 48 R. Tr. + 1. Detached retina. Tumor in temporal Breas area chorioid. Also in iris and p. 31. 29 Rowan, J. H. R. Archiv d'Ophtal., xviii, 1898, F. 48 R. Tr. + 1. Detached retina. Tumor in temporal Breas area chorioid. Also in iris and p. 31. 20 Rowan, J. H. Roy, Lon. Oph. Hos. Reports. F. 37 R. and L. R. Tn. Flat tumor in chorioid. Optic nerve. Solera. 29 Actached retina. Ex tra a ocular growth. Invasion of ciliary body, optic nerve.
Wagner, C. Ueber Metanor, handtumor, handtumor, Halle, 1891. Behultze S., 2d. P. 76, 19, 20, 20, 24, 21, 21, 22, 38, 38, 38, 38, 38, 38, 38, 38, 38, 38	Samelsohn de Schweinitz, Geo. E., 1st. de Schweinitz, Geo. E., 2d. von Michel. Rowan, J. La Grange, F., 2d. La Grange, F., 2d. Rockliffe, W. C. Parsons, J. H.
2 8 8 8 8 8 2	3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

F. L. Oatman's List, American Journal of Medical Sciences, vol. cli, March, 1903, p. 375. (Figures in brackets are Oatman's numbers.)

Duration of Life After First Eye ymptoms.	"Short time."	5 months.	7 months.	18 months.	
Secondary Deposits Other Than Eye.			Lungs and medi-	R. lung, kidneys, spleen and glands.	
Seat of Primary Growth.	Liver	Breast, 1 year.	Right supra-	Liver	
Pathological Examination of Eyeball.	Flat tumor, nodular, in chorioidal Liver, network elastic fibers.	Discoid tumor in chorioid, Sclera Breast, 1 year.	Detached retina. Glaucoma. Adeno- Right supra- Lungs and medi-7 months.	care, in chorious and chiary body. Detached retina, Glaucoma, Adeno- carcinoma chorioid, optic nerve and sclera.	Suker and Grosvenor add the following cases:
Tension of Globe.		:	T.+	T. + 1	venor ad
R, - L. Tension of Globe.	R.	R. and L.	R	:	and Gros
.egA	200	45	88	26	ker
Sex.	Fi	댠	M.	M.	Su
Where Published.	Corrbl. des allg. Aerzt. Verer F. 58 R	Ibidem, 1898, 2, S. 31 F. 45 R. and L.	Hospitals Tidente, ix. 1900, 4. M. 30 R	Am. J. Med. Sc., cli, 1903, p. M. 56 L	
Author.	Kaemmerer	Wagenman	Bentzon, Ch	Oatman, E. L	
No.of Case.	23	35	36	80 32	

			Suk	er a	na Gro	svenor ac	Suker and Grosvenor and the 10110Wing cases:	. ses				
300	38 Chevallereau Reone	Reone generale d'ophtal., F. 38 R	F	38 H		:	Detached reting. Flat tumor cho- Breast	lat tumor cho-	:	Intestines, stom- 12 months.	om- 12 mc	onths.
39	Bajardie	Giornale della R. Ass. di med. F. 60 L di Torino, 1900, p. 447.	Ei.	09		Tn	Flat tumor of the chorioid,		Stomach	acu.	"Several months	Several months."
40	Blessig	St. Petersburg med. Woch., No. 31, Aug. 17, 1901.	Œ.	35 F		Tn	Flat tumor of the che	orioid	racheal and bron, lymph	Cervical gla	nds, 5 moi	nths.
4	Jack, E. E., and Verhoeff, F. H.	41 Jack, E. E., and Trs. Am. Oph. Soc. ix, 1902, p. F R. and L. R. T. + 1 Detached retina. Flat tumor cho-Left breast, Brain and abdom-labout 12 Verhoeff, F. H. 483.	Ei.	:	and L	R. T.+ 1	Detached retina. F	lat tumor cho-	glands; 6 mo.	Brain and abc	lom-Abo	ut 12
42	Krukenberg	Klin. Monatsbl. f. Augenhk.,	E.	42 I	op	T. + 1	Detached retina. F	lat nodular tu-I	reft breast	Lungs	8 mo	nths.
43	Brewitt, F., 1st	43 Brewitt, F., 1st Inaug. Diss. Goettingen, 1908, F. 52 R. and L	Fi	52 F	and L		Flat tumors of chorioid—both eyes, Right breast, L. breast, lower 12 months.	ioid—both eyes. I	light breast,	L. breast, lower jaw, glands of	wer 12 m	onths.
44	44 Brewitt. F., 2d	Ibidem	E.	53 E	F. 53 R. and L.		R. "knobby" flat tumor chorioid and Lung forward into ciliary body. L. Flat	or chorioid and I y body. L. Flat	gunr	Abdominal or 8 months.	or-3 mo	nths.
45	45 Reis, W. Klin.	Klin. Monatsbl. f. Angenhk., M. 59 L.	M.	29 I		T. + 3	tumor. Detached retina. Glaucoma. Adeno- Stomach	aucoma. Adeno-		Brain and perito-"Few	rito- "Fev	V nthe "
46	Greenwood, A., and Southard, E. E.	46 Greenwood, A., and Boston M. 55, J., Sept. 10, M. 56 L., Southard, E. E. 1903, exlix, p. 287.	M.	26 I		T+	2 flat tumors in chorioid—fused Prostate.	oid-fused		Bladder, peritone- "Few mum, lungs, pleu- months."	one-"Fev	oths."
47	Ginsberg. S. 1st	47 Ginsberg, S. 1st Grundriss Path. Histol des M. 45 R Auges., 1903, p. 293.	M.	45 E			Flat tumor chorioid		. Unknown	Cervical glands 7 months.	ls 7 mo	nths.

	K, F. F. S. F. F. S. F. F. S. F. S. F. F. F. S. F.	42 R Tn	Tn	Flat tumor chorioid. Ontic nerves Left breast.		ereasandkidney.	
Holden, W. A., and N. Rusk, G. Y., 2d. Cupprez, H	Et. 15. F. 18. F. 18. F. 19. M. 19. F. 19. F	5 L	Tn		:	DRIE, OFDIES RIE	Skin, orbits and "Several
Rusk, G. Y., 2d. Copper, H. Y., 2d. Bailliart R. Gelpke K. Weeks, J. E. T Oeller, J. A Marbe D Kowalewski, R. Z Thomson, E. S. N Uhthoff, 3d. 36 Ginsberg, S., 4th. P Sutphen, T. Y	ж, Е. Б.	9 D ou		involved. Detached retins. Flat tumor cho- Ovarv		Skull. Brain and abdom-	weeks.
Bailliart R Gelpke K Weeks, J. E. T Oeller, J. A Marbe D Kowalewski, R. Z Thomson, E. S. N Uhthoff, 3d. S. Whitehead, A. L. T Ginsberg, S., 4th. P Sutphen, T. Y. P	K, F. 5	THE CALL	I.	Many flat nodules under detached Cervical			8 months.
Gelpke K. Weeks, J. E. T. T. Oeller, J. E. T. A. Marbe. D. Kowalewski, R. Z. Thomson, E. S. N. Uhthoff, 3d. S. Whitehead, A. L. T. Ginsberg, S., 4th. P. Sutphen, T. Y. P. P.	x, F. 5	Band	I. R. Tn	retina, Glaucoma, Detached retina, Plat tumor che, Right breast, Brain, medulla, 3 months.	Right breast.	Brain, medulla	8 months.
Weeks, J. E. T. T. Oeller, J. E. A. Marbe. D. Kowalewski, R. Z. Thomson, E. S. N. Uhthoff, 3d. S. Whitehead, A. L. T. Ginsberg, S., 4th. P. Sutphen, T. Y. P. P.	ъ., F. 5		L. Th.	rioid. Clinical only.	3 years.	spinal cord and	
Weeks, J. E Toeller, J	×	1 L	T. + 3		id,	10 Langs, pleura and 2 months.	2 months.
Marbe		:		Adenocarcinoma of the chorioid Lung		Axillary glands	
Marbe	305. F. 4	7 R. and	1 L. R. Tn	R. Detached retina reattached. In-	Right breast,	In-Right breast, Lungs, pleura, 8 months.	8 months.
Marbe	ay,		L. Tn	vasion of selera and epibulbar tis- sue. L. Detached retina. Cho-	4 years.	spleen and dura.	
Kowalewski, R. Thomson, E. S. Uhthoff, 3d	T 16) R and	1	and ciliary body involv	Right broad	ed. Right breast Dolvie house ab 4 months	4 months
Kowalewski, R. Thomson, E. S. Uhthoff, 3d Whitehead, A. I. Ginsberg, S., 4th Sutphen, T. Y.	-	110 77			6 months.	dominal organs.	T THOUGHT
Thomson, E. S. Uhthoff, 3d Whitehead, A. I. Ginsberg, S., 4th Sutphen, T. Y.	906, F. 4	8 R	T. + 1	Flat tumor chorioid. Temporal side Right breast.	Right breast,	Posterior lobes of 8 months.	8 months.
59 Uhthoff, 3d	ct F. 4	48 R	T.+	Flat tumor chorioid. Invasion optic Right breast	Right breast,	Didin, kluncys.	12 months.
 59 Uhthoff, 3d 33d Oph. Gesellsch. Heidel. F. berg, 190f, Arch. Ophthal y. xxxvi, 1907, p. 268. 60 Whitehead, A. L. Trs. Op. Soc. U. K., xxvii. F. 1907, 161. 61 Ginsberg, S., 4th. Personal letter, Aug. 9, 1908. F. 62 Sutphen, T. Y Personal letter, Aug. 25, 1908. F. 	l'y,			nerve and epibulbar tissue.	S years.		
	Fi	54 R. and L.	1 L.	R. Reattachment of detached retina. Left breast	Left breast	Brain, spingl cord, 3 months.	3 months.
	l y,			Invasion of both ciliary bodies. L. Confluence of several foci.		neckglands, axil- la, thyroid, ster-	
	vii. F. 3	H.	T. + 2		Tu-Right breast, Scars	num, l'gs, uterus.	3 months.
	1 5	0	T D T.	-	9 years.		Tonous Sta
	. F.	o n. an	L Th.	atrophy. Flat tumors in chorioids.	Dreast	brain, dura, skin. Several	months."
	08. F. 3	33 R		Detached retina, Clinical only Right breast, Glands all over 8 months.	Right breast,	Glands all over	8 months.
63 Leber, Theo Person al communication, F.	on, F. 6	61 L	T. +	Tumor in chorioid and ciliary body. Right breast,	Right breast,	H	
Dept. 29, 1900.				growth, Glancoma, Epibulbar	o years.	Operation.	
64 Suker, G. F., and Trs. Am. Acad'y Oph. and F. 47 L T.+. Grosvenor, L. N. Oto-Laryn, Aug., 1908.	and F. 4	7 L	T.+	Detached retina. Flat tumor cho. Left breast, rioid. Invasion optic nerve and 2 years.	Left breast, 2 years.	4	10 months.
				epibulbar tissue.		region, lungs.	

Sex—Males 14, females 48, not stated 2. Age—Between 20 and 30 years. 1; between 30 and 40, 14; between 40 and 50, 23; between 50 and 61, 21; not stated, 5. Average of 58 cases is 45.72+ years. Eyes. Both involved in 20 cases. Figure 1. By a minus (--) in 4, not stated in 3. Tension—Neght breast in 130 cases, left in 12, "breast, in 7, minus (--) in 4, not stated 6, stomach 4, liver 3, thyrold 2, 1 each, mediastinal glands, tracheo bronchial glands, cervical glands, suprarenal gland, prostate, ovary; not stated, 4.

Time elapsed between first involvement of eye and death—In 48 cases an average of 7 months. In 16 cases the time mentioned is too indefinite or not specified at all. RESUME OF THE TABLE OF CASES.

instance, namely, a failure to get a complete clinical or pathological⁵ examination of the case or specimen.

ORGANS AND INTRAOCULAR TUNICS INVOLVED.

It is certainly surprising that, although carcinoma uteri is of frequent clinical appearance, intraocular metastases therefrom are correspondingly infrequent. In our series of sixty-four cases not one had the primary carcinoma in the uterus; yet metastases in the uterus from the primary organ were quite frequent.6 In a careful study of the history of the reported cases and an analysis of the various statistics no warrantable deductions can be drawn why metastases from the uterus should not be at least as frequent as those of stomach, liver and lungs. Several theoretical reasons for this can be assigned; however, as they are only conjectural, we will forgo them.

The carcinomic metastasis by preference invades the chorioid and is brought there as a cardiac embolus. It reaches the temporal region of the eye by way of the ciliary arteries principally, though cases are reported in which it reached the eye by way of the lymph channels.7 This metastasis remains in general rather closely confined to the first ocular tissue invaded. Very seldom are there several metastatic foci; s if so, upon growing they usually coalesce. With a primary metastasis in the chorioid, the iris and ciliary body are most frequently involved by extension or invasion and not by secondary or tertiary metastatic foci.9 In each instance, though, the growth or extension is nearly always along the paths of least resistance.10

The metastasis in the chorioid assumes the characteristics of the primary growth, i. e., medullary, scirrhus or adenomatous. In a good many instances these three types are manifested in an individual metastasis; however, the characteristics of the primary growth predominate. This fact is particularly exemplified in a

6. Only one case, No. 59, reported by Uhthoff, had secondary involvement of the uterus.

8. Cases of more than one metastatic focus in the chorioid: No. 11, Schultze;

than breaking through them.

^{5.} In the eye there are no cells in which a carcinoma may originate, whereas there is much connective tissue from which a sarcoma may start.

^{7.} Brewitt's case, No. 44.

^{8.} Cases of more than one metastatic focus in the chorioid: No. 11, Schultze; 18, Holden; 46, Greenwood and Southard; 51, Coppez; 59, Uhthoff.

9. Cells often get loose in the intrabulbar space and wander by way of the lymph stream to other parts of the eye, upon being deposited give rise to local metastases. In this way tertiary deposits are found in the angle of the anterior chamber (Abelsdorf, 20; Michel, 28) or even get in between the ciliary processes. (Michel.). See Note 3.

10. The extension of carcinoma, here as elsewhere, is very characteristic, usually insinuating itself between the fibers of the structures it meets rather than breaking through them.

metastasis from the liver in the chorioid in which the typic liver cells, alveoli, and biliary pigment were observed (Bock's case).¹¹

The only intraocular tumor for which metastatic chorioidal carcinoma can be mistaken is a flat sarcoma or so-called endothelioma, and this, by preference, is in the ciliary body and rarely in the chorioid, and is, in addition, of rare occurrence-

The breast seems to be the most usual seat of the primary carcinoma. In this series 39 such cases are reported, 20 in the right, 12 in the left breast, in 7 the right or left breast was not specified. Following the breast in frequency are the lungs with 6 cases, then the stomach with 4, the liver 3, finally the anterior mediastinal glands and thyroid with 2 each. Observe that the above organs are next, with the exception of the breast, in order of frequency to carcinoma of the uterus. Primary carcinoma of the breast and uterus or cervix are nearly of like frequency. Rather unusual seats for primary carcinoma are the following organs, of which one each is found in this series of 64 cases: suprarenal body, prostate and ovary.¹²

This analysis of the primary seat of the chorioidal metastasis of carcinoma compares favorably with and is about on a par with the sarcomatous metastases occurring in these other various distant organs when the primary sarcoma is in the chorioid. It is unnecessary to quote statistics or data in this behalf, as they are all too familiar to us.

AGE AND SEX.

This being the largest statistical report on chorioidal metastatic carcinoma, it will serve better to calculate averages than any heretofore. We find the average age of appearance is 45.72 years in 59 cases, whereas Oatman in his list of 30, found it to be 44.37. Hence we can fairly well assert that the chorioidal metastasis is prone to occur between the fourth and fifth decade. In 5 cases the age was not given. The youngest on record is a female of 28 and the oldest a female of 61. In reference to age, sarcoma appears more often at about 30, while the sex proportion is about the same,

^{11.} Bock's case: There was a definite tumor, deep green in color with large polygonal and cylindrical cells arranged in a manner like liver cells; the lumina contained bile and gave the reactions for biliverdin; the liver, skin, lungs, muscles, orbit and arachnoid were involved. Wintersteiner (Encyclop. d. Augenhk., Leipzig, 1902) classified it as a metastatic carcinoma, primary in liver, though Bock regarded it as an adenoma. (Bock: Virchow's Archiv., xci, 1883.)

^{12.} Bentzon (No. 36): Found primary carcinoma in the right suprarenal body at the autopsy. Greenwood and Southard (No. 46): Male, primary in prostate. Holden and Rusk (No. 50): Insane woman of 35; autopsy showed primary carcinoma in ovary.

if anything favoring the male (Wood and Pusey's Primary Sarcoma of the Iris, Arch. Ophthal., 1902, xxxi, 4).

As to sex, there were 48 females and 14 males, with the sex of two not specified. It, therefore, occurs more than three times as often in the female as in the male (3 3/7). Oatman found the proportion 2 to 1. This large percentage of females is accounted for by the fact that the majority of primary carcinomata were in the breast and is not due to the difference in sex as such.13

In Wood and Pusey's series of 96 cases of primary sarcoma of the iris there were 42 females and 52 males, with a very large percentage under the age of puberty, a very significant fact in regard to sarcoma. If this percentage is true for the anterior segment of the globe as pertains to males, it is not quite so marked for the posterior segment, as we all well know.14

SITE AND CHARACTER OF THE TUMOR.

As the carcinoma is a pure metastasis in the eye, brought there as a cardiac embolus, we need not marvel greatly why it is usually lodged in the posterior half of the globe. For after the embolus once enters the ophthalmic artery it, by preference, enters the ciliary rather than the centralis, as the former does not leave the ophthalmic at nearly as much of a right angle as the centralis. An embolus usually takes the current of greatest velocity and also usually occupies the center of the current, hence would naturally get into a vessel that does not leave another at right angles. Any metastasis from the abdominal cavity must go by way of the vascular route in order to reach the eye, as there is no direct lymph channel from these cavities to the eye or orbit. Most often the embolus enters the eye by way of the posterior ciliary arteries. In one instance (Biehn's case¹⁵) the embolus was lodged in the iridociliary region and hence must have been carried there by way of the anterior ciliary artery. The lodgment of the embolus in the

case, No. 31). In Biehn's case there certainly was either a malignant embolus here or due to one in the long posterior cliiary artery. This latter was a metastatic carcinoma of the ciliary body and iris (Dissert., Königsberg, 1902).

^{13.} American Journal of the Medical Sciences, March, 1903.

14. It is impossible to be absolutely certain that sarcoma of the chorioid is always a primary growth. Elschnig (Arch. f. Augenhk., xxii, 1891) holds the opposite view, though the preponderance of evidence is in favor of the primary growth. Metastatic sarcoma of the chorioid has been reported by: No. 1, Bromser, Inaug. dissert., Berlin, 1870; No. 2, Schiess, Gemuseus and Roth. Arch. f. Ophthl., xxv, No. 2, 1879; No. 3, Pflüger, Arch. f. Augenhk., xiv, 1885. The primary sarcoma in these cases was a nevus on the cheek, over the sternum or over the parotid gland. Bromser's case is questioned because of the inaccuracy of the diagnosis of the pulmonary growth. In Schiess-Gemuseus' case the papilla with the adjacent chorioid was involved; and in Pflüger's case no microscopical examination was made. So in these three cases the metastatic nature can rightly be disputed if not denied. rightly be disputed if not denied.

15. Malignant emboli have been seen in the anterior ciliary artery (LaGrange

immediate macular area with the resulting retinal detachment accounts for the rapid loss of vision as the tumor progresses in size.16

From this point the carcinoma cells rapidly proliferate through the vessel wall and into the interstices of the chorioidal stroma, encroaching upon and destroying the latter and also materially implicating the chromatophores. The tumor cells force their way along the paths of least resistance; therefore, within the meshes of the chorioid. Eventually the tumor assumes a discoid character and gradually tapers off into the normal chorioidal tissue. 17 The tumor is seldom thicker than two or three millimeters at the center

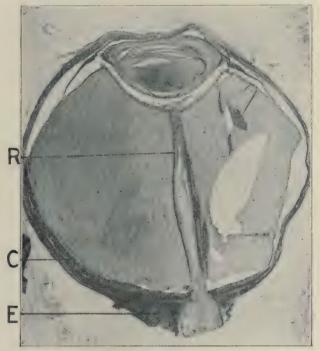


Figure 1.

Eye ball. Cross section. C-Carcinoma of the chorioid: R-Detached retina; E-Epibulbar tumor.

and gradually tapers towards the periphery as before stated. It finally encircles the disc and cancer cells can often be seen penetrating at this point into the intraneural lymph spaces and de-

^{16.} The ciliary body is usually involved by continuity or by tertiary and rarely by secondary deposits. The iris is similarly involved, but whether by continuity or by the blood or lymph channels is difficult to positively determine.

17. The three layers of the chorioidal blood vessels, that have been more or less replaced or displaced by the carcinoma cells, now resume their normal relations as the tumor cells gradually taper off. The limiting membranes remain intact.

tached retina¹⁸ (Fig. 2). Bruch's membrane and the membrana hyaloidea are seldom perforated, hence carcinoma cells are usually not seen in the retina or vitreous. This is not so with sarcoma, but the reverse obtains most frequently. Numerous hemorrhages within the tumor and in distant chorioidal areas are often seen. Large necrotic areas are frequently observed, often macroscopically recognized by their peculiar yellowish color¹⁹ (Figs. 4 and 6).

The tumor grows more rapidly toward the temporal than on the nasal side, not infrequently crowding upon the ciliary body, processes and iris angle as shown in Leber's case (Fig. 5). Local secondary metastases are not usual; fortunately, the adjoining tissues and structures are involved rather by direct extension and continuity of tumor cells. In many cases the carcinoma cells penetrate the sclera by ramifying between its fibers. Rarely do they perforate the sclera. Many cases show extra bulbar growths, but these are not due to perforation but rather to metastases from the chorioid by way of the ciliary vessels and nerves.20

These above tendencies of the carcinoma are directly opposite to those of sarcoma.

The retina at first is only slightly detached, but eventually a rapid and total detachment ensues, except at the disc and ora serrata. The suprachorioidal spaces remain relatively immune.

With the ophthalmoscope, in the beginning, there is a yellowish or grayish white reflex, not revealing many vascularizations or definite details. Soon all details are lost, owing to vitreous disturbances and extensive retinal detachment.

The optic nerve is seldom attacked in continuity, the growth usually stopping at the edge of the disc (Fig. 2). The nerve may be partly or entirely replaced by the new growth even as far as the chiasm.20a

TENSION.

There is no unanimity as to whether it is usual during the progress of an intraocular tumor to have increased or decreased tension. More often one encounters a minus tension with carcinoma than

^{18.} Invasion of the retina in five cases: No. 4, Hirschberg and Birnbacher; 31, LaGrange; 29, Rowan; 37, Oatman; 64, Suker and Grosvenor.

19. Bruch's membrane usually remains intact. In one of Ginsberg's cases it was broken. If this occurs, the tumor assumes a globular form. Gelpke, 53, reports a tumor of "hazel nut size," protruding into sub-retinal space.

20. Extra bulbar growths, Nos. 11, Schultze; 16, Unthoff; 18, Holden; 19, Schultze; 20, Abelsdorf; 25, Samelsohn; 28, Michel; 31, LaGrange; 55, Oeller; 58, Thomson; 63, Leber; 64, Suker and Grosvenor.

20a. (3, Schoeler and Unthoff; 10, Kamocki; 20, Abelsdorf; 22, Matthewson; 23, Marshall; 31, LaGrange; 33, Parsons; 37, Oatman; 49, Ginsburg; 58, Thomson; 64, Suker and Grosvenor). Optic nerve only was involved in several Krahn, Zehender's Klin. Monatsbl., x, 103; Holden, Arch. Oph., xxxi, 427). cases (Elschnig. Arch. Oph., xx, p. 370; Dittrich, Prager Vierteljahrschr., xii.;

with sarcoma. To say that an intraocular growth confined to the chorioid and producing minus tension is not a sarcoma, as Marshall writes,²¹ is open to valid objections. We personally have on record several cases of sarcoma with minus tension. Wood and Pusey, who tabulated 96 cases of primary sarcoma of the iris, encountered one with positive minus tension and several which could possibly be said to have the same also. In our series of carcinoma there were four cases with minus tension, a relatively large percentage.

TABLE 1 .- SARCOMATA OF THE CHORIOID NOT INVOLVING CILIARY BODY.

Increased tension	16	Per Cent. 67.92 30.18 1.88
Total	53	
TABLE 2 SARCOMATA IN WHICH CILIARY	BODY IS	AFFECTED.
Increased tension	14	Per Cent. 35.71 50 14.28
Total	28	
TABLE 3.—GLIOMATA.		
Increased tension	10	Per Cent. 36.84 52.63 10.52

The point at issue in taking tension is: What degree of intraocular tension constitutes a normal tension? No definite standard has been universally accepted. May not many of the cases recorded as having nearly normal tension be construed as having a virtual minus tension, provided we had a fixed standard of measuring tension? To use tension as a valuable differential diagnostic point

forms of glaucoma, viz., the closure or diminished size of angle of anterior chamber.

(d) Diminished tension by no means uncommonly occurs when the ciliary body is involved, but I have been unable to find an undoubted case in which the tension has been reduced when the chorioid only is affected.

tension has been reduced when the chorioid only is affected.

(e) A majority of the cases of sarcomata affecting the cliiary body have no increase in tension. Of these a few have minus tension and a far larger number show no alteration from the normal.

(f) Most cases of gliomata have normal tension. A few are met having diminished tension and the rest have no evidences of tension. Their anatomical condition following the rule previously mentioned.

(g) Many cases doubtless exist in which the tension varies in different stages of the disease.

(h) In all cases the tension bear a discount of the condition of the cases the tension bear a discount of the case the tension bear a discount of the case the case the tension of the case the tension of the case the case

(h) In all cases the tension bears a direct relation to the size and condition of the angle of the anterior chamber; when inflammatory changes occur it depends also upon the plastic or serous nature of the fluid contained in the

^{21.} Marshall (Tension in Cases of Intra-Ocular Tumors, Trs. Oph. Soc. U. K., 1896, vol. xvi, p. 155) concludes from 100 cases:

(a) The size of the tumor has but little to do directly with the tension of the eye containing it until the point is reached when it practically fills the globe or else perforates it. When the latter occurs the rupture is in the position where normally vessels enter or leave the eye.

(b) The course of the increased tension is the same here as it is in other forms of glounders when the placement of subject of enterior of the course of subject of enterior of the course of subject of enteriors.

⁽c) It is far more frequent to find the angle closed in sarcomata of the chorioid only than where the growth is farther forward and the ciliary body and iris are affected.

in any stage of any intraocular tumor—whether same be in chorioid, iris, ciliary body or retina, is not warrantable. The element of tension depends largely upon the extent of the tumor and its so-called inherent pernicious activity and its relative location to the filtration angle of the eye. The nearer the filtration angle and greater the encroachment in addition to the intensity of pressure exerted by tumor on the chorioidal venæ vorticosa and the greater the amount of so-called tumor secretion, the sooner does tension ensue.

In this series of 64 cases the tension was noted as follows (at time of first examination): Increased in 22, decreased in 4, normal in 30, unrecorded in 28. In all there were 84 eyes involved in the 64 cases. In looking over the table one notices that increased tension, both early and prolonged, usually accompanied a large cancerous implication rather than a smaller one. In each instance the tumor extended well toward the filtration angle. We fail to see of what clinical significance tension is in determining therapeutic measures when dealing with intraocular sarcoma or carcinoma. However, it is quite significant that in bilateral intraocular carcinoma the tension was uniformly raised.²²

The relatively large proportion of minus tension—4 out of 84 eyes—is not to be lost sight of in connection with the fact that in about 99 of 100 cases of sarcoma it is increased. If tension is to be assigned more significance than it at present holds, cases of chorioidal carcinoma must be studied early and often, for the patient usually succumbs within seven to eight months after the first eye symptoms are manifested. This short duration of life after ocular involvement does not hold true for sarcoma. The growth of sarcoma is relatively slow as compared with that of carcinoma, hence tension is not so prone to develop early.

In many of the cases tension first develops subsequent to total detachment of the retina, excessive dragging or pressure on the filtration angle in addition to the practical obliteration of the vitreous. All of these conditions obtain in rapid succession in chorioidal metastasis. In our case the iris angles are obliterated by the crowding forward of the iris, lens, ciliary processes and retina due to

^{22.} Of the bilateral cases, 8 had normal tension in both; 1, tension + in both; 3. tension + in the right and normal in the left; 1, tension — in left, normal in right. In 7, tension was unknown. We can reasonably assume an increased tension in some of the latter seven making the percentage significantly high. In single eyes involved tension was + in 15.

the pressure of this large amount of subretinal fluid. This condition, probably, frequently accounts for the increased tension in some of the other cases. May not some of the conditions—perhaps purely physical—which allow a brain tumor a certain latitude without producing pressure symptoms be taken into consideration when speaking of intraocular tension caused by a tumor? In the brain there are certain filtration angles similar to those in the eye. ²³ Brain tumors do not always cause increased intracranial pressure, and neither do intraocular tumors. May not investigations along these lines be productive of some good?

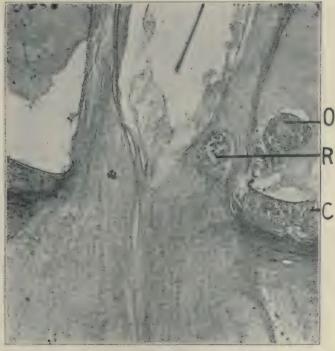


Figure 2.

Optic nerve and retina. O—Carcinoma in subretinal space; R—Carcinoma in detached retina; C—Carcinoma in the chorioid.

RETINAL DETACHMENT.

The rapid loss of vision in these cases is largely to be ascribed to the early and rather extensive retinal detachment. This detachment is more extensive in carcinoma than in sarcoma. The detachment is due to a combination of circumstances: (a) interferences with the chorioidal circulation (Graefe, Fuchs); (b)

^{23.} Fraunen magnum, optic and olfactory nerve sheaths and the ventricles.

secretion of an albuminous fluid from the carcinoma cells and necrobiotic material due to pressure in the immediate structures; (c) shrinking, detachment and degeneration of the vitreous. several instances the three factors were extensively operative.

The detachment in the early stages is more like a flat detachment because of the nature of the growth of the tumor-flat or discoidlike—and not as in sarcoma—globular, or like our friends across the water term "knobby." In Wintersteiner's case there is a complete detachment of the retina, although there are but two small nodules of metastatic carcinoma in the chorioid (Fig. 6). In the early stages the retina over the site of the tumor is uniformly elevated and frequently confined to the tumor area, while with sarcoma the detachment may be at several points in addition to that over the site of the tumor. Ultimately in each a total retinal detachment is to be expected. However, in some few instances a reattachment of the retina did take place for a time being.24 This occurrence, however, is relatively rare in either variety of tumor.

One characteristic of the carcinoma cell is that it does not invade the retina as extensively as one would suppose²⁵ (see Fig. 2). Carcinoma cells if they do penetrate the retina do so at the disc margin rather than elsewhere. Another feature is a relative small amount of subretinal fluid in the early stages. It is less abundant than in sarcoma of corresponding size and age.

THE MANNER OF ENTERING THE EYE.

The primary metastasis is carried to the eye most often by way of the posterior ciliary arteries as a cardiac embolus. It enters the second eye by the same route. In two instances (Ewing, 12, and Wagenman, 35) the metastatic invasion of the second eye occurred months after the removal of the first eye. Therefore, the view of Manz and Wagner, that the cancer cells migrate from one eve to the other by way of the lymph channels of the optic nerve tract, does not seem very feasible. For if this were so, then the metastasis would by preference develop in the papilla and no such case has ever been recorded. Schultz²⁶ ventured this idea and our series of 64 cases with no papillary metastasis is rather an ample verification of this contention.

along the lymph spaces.

^{24.} Reattachment of detached retina noted by Oeller (55) after many operative procedures, but became detached after several weeks of good vision. Uhthoff (59) reports a spontaneous reattachment of a detached retina.

25. The flat sarcoma follows the path of least resistance, as does the carcinoma. In both the cells lie between the planes of the chorioidal structure,

^{26.} Cases of Rockliffe, 32, and Thomson, 58, suggest the possibility of invasion by the central artery of the retina on account of the extensive replacement of optic nerve structure by the carcinoma cells.

There is no authentic case on record in which the metastasis entered the eye by way of the arteria centralis retinæ. At least none could be found in this series of 64 cases, and no mention is made of its involvement in the microscopic examination of the enucleated globes. In one or two instances the posterior ciliary artery was found to be completely occupied by cancer cells, and in portions thereof the vessel walls had been destroyed and the endothelium replaced by cancer cells. Nevertheless, the fact still remains that carcinoma metastasis or cell migrates preferably by way of the lymph channels. However, only in a general carcinomatosis

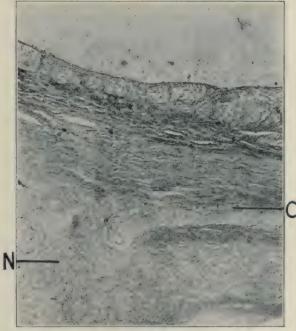


Figure 3.

Sclera and epibulbar tumor. C-Carcinoma in the perineural lymph spaces of long and ciliary nerve; N-Cross sections of nerves and carcinoma.

or in an organ excessively involved do the cells emigrate by way of the blood vessels (this can be seen in our specimen). At times one can see the carcinoma cells penetrate the vessel walls from without.²⁷

It is seldom that both eyes are simultaneously involved. Usually a brief period of time intervenes. In about one-third of the cases

^{27.} This is a very plausible reason for the occurrence of hemorrhages in the tumor masses.

both eyes are involved. This percentage agrees with that of Marshall, Parsons and Oatman. In this series of 64 cases 20 were bilateral, 21 limited to the right eye, and 19 to the left, while in 3 cases the particulars in this behalf were not stated. This bilateral tendency of carcinoma is in marked contradistinction to the unilaterality of sarcoma, while with reference to the proportion of right or left eye, the percentages for sarcoma and carcinoma are virtually the same. Bilateral sarcoma is extremely rare, while with carcinoma it is of frequent occurrence, 20 in 64.

In this connection it may be said that we do not accept the theory as proven that a cardiac embolus enters by preference the left common carotid, thus the left eye is more often invaded than the right. The differential proportion of 21 right and 20 left is not great enough to warrant such a bold assertion, and particularly so when we take cognizance of the fact that the ophthalmic artery leaves the internal carotid at right angles and the arteria centralis retinæ at nearly right angles from the ophthalmic, while the ciliary leaves the ophthalmic at an angle of about 35 degrees. The momentum of the carcinoma embolus in the carotid would tend to carry it by the ophthalmic because the latter leaves the former vessel at right angles. But when the embolus once enters the ophthalmic it is more apt to enter the ciliary than the arteria centralis because the former is not given off at right angles. Then, too, the large proportion of bilateral metastasis, namely, 20 out of 64, would not tend to substantiate this assumption of the more direct blood current. It is as Oatman verily says,28 "No satisfactory explanation has yet been offered of the fact that this extremely rare metastasis occurs in one eye; the other eye is practically liable to a similar invasion"; and we emphasize the fact that we offer the same view. ". . . No satisfactory explanation has been given for the supposed predominance of invasion of the left over the right eve."

PROGNOSIS.

The prognosis is absolutely discouraging. The average length of life after the first recognition of the chorioidal metastasis is approximately seven months. In 48 cases the total number of months which the patients survived was 336, or exactly seven months; in 16 the period of time stated was rather indefinite, such as "short time, few months, several weeks." One case (17, Wagner) survived two years after the recognition, but there is some question as to the accuracy of the clinical history. Eleven cases

^{28.} Page 13 of reprint, Am. Jour. of the Med. Sciences, March, 1908.

survived about one year after the eye invasion. This certainly is a gloomy prognosis when compared with chorioidal sarcoma causing general metastasis. In sarcoma usually several years may intervene before a metastasis occurs, either local or general.²⁹

A justification for an enucleation does not exist for carcinoma of the chorioid as it does for sarcoma. The former is already a definite and positive proof of the general systemic involvement, as the carcinoma is not a primary growth in the eye. Just the reverse obtains for sarcoma, as we well know. An early and complete



Figure 4.

Epibulbar tumor. C—Carcinoma in perineural lymph spaces of ciliary nerves; O—Carcinoma in optic nerve.

enucleation for sarcoma, therefore, is of material benefit, as it very frequently avoids either local or general metastasis.³⁰

In several instances the eye gave the first definite clew of the carcinomatous involvement. In these cases the removal of the eye apparently hastened the activity of the primary growth and led to an early death. Therefore, one wants to exercise exceeding care in

fact that an enucleation of times seemed to hasten the exitus.

^{20.} Wood and Pusey say as regards the life of the patient, the prognosis in iris sarcoma is the same as in all sarcoma. Arch. Oph., 1902, xxxi, 4.

30. In looking over the case histories one can not but help recognizing the

order to ascertain the location of the primary growth when one observes a flat tumor in the chorioid.

To enucleate the eye to prevent the carcinoma from perforating the globe and involving the orbit is a sheer fallacy. Carcinoma scarcely shows a tendency to perforate the globe, while sarcoma evidences a strong tendency.

An enucleation in these carcinoma cases is only indicated for the relief of pain and for no other purpose, as it in no way hinders or checks the fatal progress of the disease. This dictum needs no explanation when we realize that the eye implication is but a secondary manifestation to a rather generalized and evidently fatal carcinomatosis.

In two cases (Ewing, 12, and Wagenman, 35) the remaining eye became involved one month after the enucleation of the other eye. The removal, then, of the eye having the metastatic carcinoma of the chorioid does not preclude the occurrence thereof in the other; at least, such is a warrantable conclusion, judging from the history of the cases.

MACROSCOPICAL PATHOLOGICAL REPORT.

The eyeball is of the average normal size and shape. In the epibulbar angle formed by the sclera and optic nerve, on the temporal side, is a mass of tissue closely adherent.

The iris and lens are crowded forward, almost obliterating the anterior chamber. The vitreous is absorbed and the collapsed hyaloid membrane lies back of lens. The retina is separated from the chorioid by the albuminous exudate from the tumor and lack of resistance of vitreous; hence, the retina is totally detached, except at the ora serrata and optic nerve. From all sides the detached retina stretches straight forward from the optic nerve almost to the posterior capsule of the lens, where it separates and turns to the side, paralleling the posterior surface of the lens over to the ciliary body, then back along the side of the ciliary body to its attachment at the ora serrata (see Fig. 1). Back of the retina is a clear homogeneous jelly-like fluid filling the subretinal space.

The chorioid is greatly thickened, being more than 2 mm. in thickness at the macular region, gradually thinning off to normal chorioid. On the temporal side the thickening extends two-thirds of the distance around to the ora serrata and on the nasal side one-third the distance.

MICROSCOPICAL EXAMINATION.

The cornea has become irregularly flattened and there are several abrasions of the epithelial cells. These conditions are doubtless due to the handling and hardening processes of preparation; hence artefacts.

The anterior chamber is obliterated. The atrophic iris is crowded forward and in contact with Descemet's membrane throughout its extent. The lens is crowded forward against the iris and cornea. A portion of the pigment layer of the iris is adherent to the anterior capsule—a total synechia.

The ciliary body is greatly compressed and the ciliary processes are crowded up and forward against the ciliary body and posterior surface of the iris.

Posterior to the lens the membrana hyaloidea, empty of vitreous, lies collapsed anterior to the detached retina. The retina is totally detached from the chorioid by the albuminous exudate. From all sides the retina stretches straight forward from the optic nerve to the crumpled mass of hyaloid membrane back of the lens.



Figure 5.

Carcinoma in ciliary body—extension from Chorioid—Slide of Leber's Case (No. 63).

Here the retina spreads out, following closely the posterior surface of the lens over to the ciliary body, where it extends back along the pars plana of the ciliary body to its attachment at the ora serrata.

The retina retains its normal structure, with the exception of the rods and cones, which have become so degenerated that they will not take the Mallory reticular stain.

The subretinal space thus formed is completely filled with a homogeneous mass which stains a solid pink with eosin. Some of the pigment cells still retain their attachment to the retina, while more are in contact with the inner surface of the lamina vitrea of the chorioid. This lamina vitrea is intact throughout and presents a slightly undulating surface.

The lamina suprachorioidea, the outer limiting membrane of the chorioid, is broken through in many small points by the tumor cells, allowing them to infiltrate the lymph spaces of the sclerotic

(see Fig. 3).

These limiting membranes of the chorioid above described are widely separated, in a parallel manner, by a mass of typic carcinoma cells. The tumor mass surrounds the optic nerve and extends, on the temporal side, two-thirds of the distance to the ora serrata and on the nasal side one-third this distance. The plateau of this tumor reaches its extreme thickness of 2.5 mm. in the macular region. From this point it gradually thins out and finally loses itself in the normal chorioidal stroma.

The elastic and connective tissue network of a normal chorioid is almost indistinguishable, but in this case of metastatic carcinoma of the chorioid, as in all forms of carcinoma, the malignant growth has been preceded by certain constant changes. These changes are characterized by the presence of plasma cells and lymphocytes, while the other cellular elements remain quiescent. There is a loss of elastin and collagen from the sustentacular framework. Later the epithelial cell proliferation appears and as a result of this there is a most extensive proliferation of connective tissue cells. The cellular elements of the specialized structures and yellow elastic fibers undergo atrophy and the white fibers, connective tissue, become condensed and greatly augmented.³¹

In the outer layer the carcinoma cells are intensely crowded and compressed, due to the scleral resistance. These outer layers of cells, consequently, stain much more deeply with the hematoxylin than the inner and less crowded tumor cells.

The hypertrophied connective tissue cells make a large and irregularly spaced framework for the imbedding carcinoma cells. These spaces are chiefly lymphatic spaces connected with the suprachorioidal lymph spaces. Many chromatophores, in various stages of degeneration, are found in these connective tissue bands.

A large percentage of the chorioidal vascular supply has been encroached upon and compressed by carcinoma cells, practically obliterating their lumen. Occasionally a chorioidal vessel is so completely filled with tumor cells as to effectually displace the vessel content; at the same time these cells can be seen passing into and through the vessel walls. Then, again, certain vessels are completely surrounded and compressed by the carcinoma cells. In such instances the tumor cells frequently penetrate the vessel wall from without and mingle with the blood corpuscles. This latter condition may account for the numerous hemorrhages.

There are numerous hemorrhagic areas. These are of irregular shape and size and are made up, in some places, of blood corpuseles

^{31.} Bonney: Lancet, May 16, 23, 30, 1908.

only. In others a mixture of blood corpuscles and carcinoma cells. These blood clots are closely surrounded by carcinoma cells and have become more or less necrotic.

In the compact tumor cell masses near the sclera, there were found minute confluent necrotic foci, due to extreme pressure of proliferating cells up against the resisting sclera. In the clumps and nests of carcinoma cells there are larger necrotic foci throughout the tumor. Then, too, there are necrotic foci in the hemorrhagic areas.

The optic disc is completely surrounded by the tumor and the carcinoma cells come right up to the retinal nerve fibers with the full thickness of the tumor. In some of the sections, small nests of tumors cells are found invading and crowding aside the retinal



Figure 6.

A single carcinoma nodule in Chorioid-Necrotic mass in center-Slide from Wintersteiner's Laboratory.

elements. Again, a large clump of carcinoma cell invades the subretinal space at the angle formed by the detached retina and chorioid (Fig. 2).

In the optic nerve there are many islands of tumor cell invasion for a distance of 2 to 8 mm. back of the scleral ring. These islands have replaced actual optic nerve fibrillæ (Fig. 4).

In the sclera all along the fibers, next the tumor, there are many single lines of tumor cells that have broken through into the interlamellar lymph spaces.

At the epibulbar angle, on the temporal side, formed by the sclera and the optic nerve, there is a large triangular mass of tissue

greatly infiltrated by the carcinoma cells (see Fig. 1). Here are cross-sections of several nerves—the posterior ciliary. The nerve elements are greatly hypertrophied and the tumor cells are not only in the perineural lymph spaces, but also in the nerve fiber bundles displacing the fibrillæ (Fig. 4). In some of the slides are shown longitudinal sections of a long posterior ciliary nerve following its usual course forward in the sclera with its perineural lymph space filled with carcinoma cells (see Fig. 3).

Some vessels in this area are in their normal condition; others are full of tumor cells, and in some the cells have broken through the vessel walls. As this triangular mass goes forward, back of the sclera the carcinoma cells infiltrate the tissues in a typic scirrhus manner.

In the carcinomatous node removed from the scapular region the carcinoma cells infiltrate the lymph spaces.

In the secondary nodules from the axilla there are two lymph nodes partially invaded by the tumor cells as well as infiltration of the surrounding tissues.

Note.—We have had the pleasure of receiving histories of cases heretofore never published from S. Ginsberg, of Berlin; Theo. Leber, of Heidelberg, and S. T. Y. Sutphen, of Newark, N. J.; also the pleasure of studying sections of cases from Leber, of Berlin, and Wintersteiner, of Vienna. No history of this last case.

CONCLUSIONS.

The salient conclusions to be drawn from the study of these 64 cases of metastatic chorioidal carcinoma can be tabulated as follows:

- 1. It does not occur before the age of puberty, nor directly thereafter, but usually between 30 and 60.
- 2. The invariable presence of a primary carcinoma in some other organ.
 - 3. The great tendency for bilaterality.
 - 4. Exceedingly rapid loss of vision.
- 5. The uniformity in the lodgment of the embolus in the ciliary arteries.
 - 6. The uniformity in its character of growth.
 - 7. The short duration of life after its appearance in the eye.
 - 8. The rapidity of its growth along paths of least resistance.
 - 9. The scarcity of its perforating the globe.
 - 10. The rarity of epibulbar tumors.
- 11. The practical immunity of the papilla for its first appearance.
 - 12. The extensive detachment of the retina.
 - 13. The relative large percentage of minus tension.

- 14. The great tendency of having the three types of carcinoma represented in the same individual tumor—scirrhus, medullary and adenomatous.
 - 15. The proneness of directly involving the blood vessels.
- 16. The rarity of the tumor cells invading the retina and disc, either by extension or tertiary metastasis.
- 17. The seeming regularity with which the tumor encircles the disc.
 - 18. The numerous areas of necrosis and hemorrhages.
- 19. The characteristics in general being directly opposite to those of sarcoma.

AN EPIDEMIC OF PNEUMOCOCCUS CONJUNCTIVITIS. REMARKS ON ACUTE CONJUNCTIVITIS.

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Ever since I have regularly made microscopical examinations of the discharge in cases of conjunctivitis I have, like other observers, found that in St. Louis, as elsewhere, an acute conjunctivitis due to pneumococcus is not so very rare. Yet, the cases I had occasion to observe before this spring seemed to be of a sporadic kind and never had the character of an epidemic infection, there being only comparatively few during a year and usually at the periods when influenza prevailed.

In the middle of January of the current year a mild case of acute conjunctivitis presented itself in my office the secretion of which contained no other germ but the pneumococcus. healed in five days. Two weeks later another case appeared which was more obstinate; in fact, took two weeks to get well. After this almost every day brought cases of acute conjunctivitis due to the pneumococcus to my office and to the clinics with which I am connected, during the months of February, March, April and May, only a few in June and fewer in July. It was, however, not only in these cases of acute conjunctivitis that the pneumococcus seemed to be the only or most prevalent infectious microbe; even in old chronic cases of catarrhal conjunctivitis and in a number of cases of trachoma and follicular conjunctivitis the same was the case. In fact, in the many hundred examinations of conjunctival secretions which I made during these months, it was indeed a rare occurrence when I did not find the pneumococcus and often no other germ. I began to doubt the correctness of my observations, but my doubts were allayed by the statements of several able pathologists and biologists who told me that their experience was the same and that the so-called cases of influenza during this period of time proved mostly to be due to the pneumococcus.

It seems, then, that we had without a question during this spring and early summer an epidemic of pneumococcus infection and, what concerns us here, of pneumococcus conjunctivitis in St. Louis and its vicinity, for some of my cases came from towns in the neighborhood of our city. In fact, the last few cases all came from towns lying west of St. Louis, so that it appeared as if the infection was spreading in that direction.

Not having observed such an epidemic before, I was particularly interested, not only in observing the clinical, but also in following the microscopical changes of the character of the secretions and their contents during their treatment.

During the period mentioned I treated seventy-six cases in my office. They concerned patients of all ages.

In two instances three members of one family, two boys and the mother, and in two others, a brother and sister of one family, came under treatment, following each other at intervals of a few days. The other cases were not, as far as I know, followed by further infection in their families.

The infection always concerned both eyes, sometimes one was much more affected than the other, in some the second eye showed the effects of the infection only a few days after treatment was instituted.

In most of the cases the disease ran its course without causing any complications. In one case the conjunctivitis was followed by an abscess in the cornea, in one a lacrimal abscess made its appearance. In one case some phlyctenules appeared near the corneal margin and in one an ulceration took place in the skin of the lids at the nasal canthus and over the lacrimal sac. In one case the pneumococcus conjunctivitis appeared on lids suffering from chronic trachoma, the course of which was apparently not influenced by this intercurrent disease. Small hemorrhages in the bulbar conjunctiva occurred a number of times.

While all of these cases received the same treatment, the duration of the affection was not at all uniform and varied between five days and several weeks. From this we must conclude that either some of the germs were less virulent than others or that the individuals infected reacted differently to one and the same germ.

It was surely not the difference in virulence alone which was the cause of this difference in duration of the disease, as the clinical picture and the symptoms produced by the pneumococcus also varied very greatly.

Axenfeld (in his Bacteriology in Ophthalmology, p. 164) gives the following description of the clinical appearance of pneumococcus conjunctivitis: "In most cases the picture of an acute catarrh is very rapidly developed and both eyes are quickly attacked, one after the other. This catarrh may vary in duration and intensity; there are very severe cases, looking like a blennorrhea with deep

redness, great swelling and copious purulent secretion and again very mild and abortive ones in which the disease runs its course in a very few days. This shows that the clinical picture is not absolutely a characteristic one for the pneumococcus infection and that it may be clinically mistaken for other forms of infection. In spite of this when we consider the whole course of the disease we find a relatively characteristic picture in many cases." The most characteristic feature in Axenfeld's opinion is the sudden and critical disappearance of all symptoms. My experiences tend to support his views on this point. When he, however, later on adds that the "typical" course of the pneumococcus infection is apparently more frequently observed during epidemics than in sporadic cases, my experience during this epidemic was not exactly of such a nature.

In my series of cases during this epidemic there were very few cases which could exactly be called typical. In fact, what struck me most forcibly, was the variety of clinical pictures which I observed due to the same infection; not only that there were mild and severe cases, there were also cases which appeared like a chronic catarrhal conjunctivitis and several in which I felt sure from their clinical aspect that I had to deal with the angular conjunctivitis due to the diplobacillus of Morax-Axenfeld and yet they were pure pneumococcus infections.

In most cases the pneumococcus was the only microbe found, and it appeared as in a pure culture. The capsule was frequently invisible; in one case, however, it appeared well defined in the smears and in culture. Sometimes there were a few staphylococci; in one case, an infant, there were colon bacilli and in another case numerous diplococci were found which I thought were dying or dead gonococci, and the patient acknowledged just having had a gonorrhea.

The cases seen in the clinics, which were considerably more numerous than those in my private office, I could, of course, not follow up in the same manner as I did those in private practice.

The treatment in all cases consisted in frequent instillation of 25 per cent. argyrol, lavages with saturated boracic acid solution and cold compresses.

During this epidemic I had one very disagreeable experience, which, however, taught me a valuable lesson and which you will, perhaps, permit me here to relate somewhat in detail.

In the very beginning of the epidemic I made a cataract extraction on an old and feeble lady. She had been to my office a week

previously and was apparently in good health. For twenty-four hours before the operation her eve was kept under the influence of corrosive sublimate and, in fact, prepared in the same way as I have all eyes prepared for operation. When I operated, her conjunctiva showed nothing particular. The extraction was followed by collapse of the cornea and the entrance of an air bubble into the anterior chamber. The same evening my left tonsil became painful and swollen and a smear specimen showed an abundance of pneumococci. On the second evening after the operation the patient complained of some pain in the eve, which was slightly infected, but showed nothing further. When I again saw her the next morning the eve was bathed in pus, the wound lips vellow with pus and the anterior chamber almost full of pus. Both smears and culture proved an absolutely pure pneumococcus infection. spite of all I did the eve was lost, and I have been wondering ever since whether she infected me or I infected her, or whether we both were infected at the same time. Ever since, I have operated with a face veil and have had no further similar accident.

Gifford and a number of observers have proved the possibility of transmitting the pneumococcus infection from one conjunctival sac to another experimentally in an exactly scientific manner. Of course, every epidemic of pneumococcus infection proves this fact conclusively. I may add that during these months of pneumococcus epidemic, I myself have contracted a pneumococcus conjunctivitis twice, the latter of which was followed by a number of styes, and that in spite of special care to prevent infection. The time between these two infections was over two months, which, I think, precludes the idea that the second one was only a recrudescence of the first infection. Two of my patients, also, came a second time with a new infection. These facts prove that the first infection was not followed by a prolonged period of immunity, although Gifford's personal experience seems to point to a period of immunity of several weeks at least.

For a number of years authors have endeavored to formulate definite typical clinical pictures caused by the several microorganisms which produce a conjunctivitis, especially an acute one. From my experience, and more especially from my experience during this recent pneumococcus epidemic, I can not agree that this is possible. The clinical pictures vary so much with one and the same infectious agent that I have no hesitancy in stating that in almost every case of conjunctivitis it is impossible to say what microorganism it is due to without a microscopical examination and

often a culture test. Any one who makes these examinations in a methodical manner will, like myself, I am sure, be many times surprised at what he finds. Nor do I see wherein the advantage should lie in speaking of an acute conjunctivitis due to this microorganism or that one, as interesting as it is from a scientific standpoint, since or methods of treatment are but little influenced by it. Silver salts are still the main agents to be relied upon in all forms of acute conjunctivitis, the only exception being the diplobacillus conjunctivitis in which zinc salts seem to be of greater value and which by many is not looked upon as an acute form.

Finally, I wish to call your attention to a staining material which for months I have used with the greatest satisfaction in making smear specimens of the conjunctival secretion in my office, before treating the patient. This is the Azur II of the Giemsa staining solution for treponema pallidum. The air dried smear being stained for thirty seconds with a drop of a 1:10,000 solution of this stain, the surplus is washed off and the specimen, after having been dried again, can at once be examined. This stain in the short time of a few minutes, gives a beautiful picture and a much clearer one than any other stain that I know of.

DISCUSSION.

Dr. Jackson:—Within the last few weeks I have noticed an unusually large number of cases of pneumococcus conjunctivitis. I had not thought of them as constituting an epidemic until Dr. Alt was speaking of his experience. But quite a number of them, I know, have come from the east of Denver. One I remember is a doctor from Iowa who had just arrived on his vacation. Another was a woman who had been treated by a colleague of Dr. Alt's in St. Louis; had been under treatment for several months, and when I looked at her eyes I felt rather confident I had to do with diplobacillus conjunctivitis. The hyperemia of the lids, the small amount of secretion, the history, etc., led me to that idea, but I could find no germ except the pneumococcus. In that case there had been a whole series of styes.

Dr. Wood:—I would ask if Dr. Alt noticed ulcer of the cornea as a complication.

Dr. Alt (closing):—To answer Dr. Wood, I want to say I stated that in one case the conjunctivitis was followed by abscess in the cornea. It was not a large abscess. I opened it and under treatment it disappeared. In one case some phlyctenules appeared and in one an ulcer of the margin of the cornea. In one there was an ulceration of the skin of the nasal canthus. In one case there had been a trachoma, but this conjunctivitis did not influence the trachoma.

POSTOPERATIVE SYMPATHETIC OPHTHALMITIS.

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A somewhat exhaustive review of the literature of sympathetic ophthalmitis, both in the standard text-books and in current ophthalmic periodicals, fails to unearth much information on the subject in its relation to operative cases.

Indeed, this phase of the subject in many publications is touched upon not at all, while in others it is but briefly referred to. Is this due to a reluctance of operators to report such cases or are they very rare?

No doubt many cases occur which do not reach the light of publication.

In such an important matter this is unfortunate because the accumulated mass of all our experiences in *this direction* would at least be interesting and perhaps instructive.

The pathology of sympathetic ophthalmitis and the method of transmission from one eye to the other is far from clear. The various well-known theories of its path of invasion from one eye to the other lack scientific verification in pathologic findings in the tissues supposed to be traversed by the so-called passage of the inflammation from one eye to the other.

Thus the theory of the optic nerve and chiasma is not substantiated by pathologic findings in the tissue supposed to have been traversed by the pathologic organism.

Furthermore, excepting in very exceptional cases, the pathologic process in the secondarily affected eye does not begin at the optic disc. The same lack of pathologico-anatomic confirmation is found in the ciliary nerves.

The theory of a replex nervous mechanism at work seems to the writer entirely untenable in our present conception of organic pathologic changes.

The theory which seems to best explain the existence of sympathetic ophthalmitis is one of infection followed by general systemic invasion—the latter condition being the exciting cause of the inflammation in the secondarily affected eye. This view of the matter seems to be borne out by:

1. The existence of a special form of pathologic change found in the exciting eye. Fuchs, without knowing the history of the cases, was able out of a large number of enucleated eyes to select twenty-nine eyes which he considered presented the special pathologic change in the uveal tract which should be followed by sympathetic ophthalmitis.

Lo and behold, it was found that those cases all had produced sympathetic ophthalmitis and that out of the many eyes examined they were the only ones so acting. ("On new results in the study of sympathetic opthalmitis," by Dr. G. Lenz, Breslau.)

Could there be any more convincing proof that there must be a special pathologic condition in the exciting eye? This inflammation has the characteristic of an endogenous infection and is anatomically characterized by dense infiltrations in the uveal tract and not by exudates on the internal surface of the eyeball (Fuchs).

The special micro-organism has as yet not been demonstrated, but it seems fairly clear that it is not one of the pus producing germs.

Now it seems fairly clear also that this mass of infiltration in the vascular coats of the eyeball affords an excellent supply depot for the invasion of the general circulation by the special infectious agent which produces the sympathetic ophthalmitis.

2. The indisputable evidence of a mild general infection, as evidenced by more or less profound general constitutional depression, malaise, loss of appetite. Elevation in temperature, and pulse, great pain around the exciting eye and a peculiar prickling sensation out over the distribution of the ophthalmic division of the fifth nerve.

In all the cases of sympathetic ophthalmitis that I have been able to observe, clinically these symptoms were certainly present. The patients were sick; they all felt badly depressed; they all had elevated temperatures from ½ to ½ degrees F.; they all had pulse acceleration, and they all presented great pain in the exciting eye; and, furthermore, they all manifested the peculiar symptoms of pricking of the cutaneous distribution of the ophthalmic division of the fifth nerve. These symptoms will be referred to in case reports to follow.

It would seem to the writer that some valuable information relating to the early recognition of an impending sympathetic ophthalmitis might be obtained by a systematic series of blood examination in these cases. An early leucocytosis would probably be found in impending cases. 3. The result of treatment carried out in accordance with modern ideas strangely enough offers a sort of confirmatory proof of a general infection being at the bottom of the cause of sympathetic ophthalmitis. It is necessary in order to understand this phase of the subject to refer briefly to Nature's method of counteracting and expelling from the body an infection.

It is clearly established that this is accomplished by a process known as leucocytosis or increase in the white blood cells, whose function it is to take care of and destroy the invading organism in the various infections.

Now, furthermore, the very best modern method of combating sympathetic ophthalmitis is the heroic exhibition of sodium salicylate, according to the method of Gifford.

Why sodium salicylate should control sympathetic ophthalmitis or any other infective inflammatory manifestation in the uveal tract or sclerotic coat was for many years to the writer an unanswerable conundrum, until experimentation with blood counts, before and after its exhibition, revealed the fact that an immediate and constant result of its exhibition was found to be a raising in the number of white blood cells.

In other words, it is an agent which might be said to produce a medicinal leucocytosis.

Its favorable action is not so much due to its antiseptic qualities or its so-called anti-rheumatic effect, but rather due to this power of raising artificially the power of the blood to fight infection and a priori any disease which is uniformly and decidedly improved by its exhibition is probably due to some form of infection.

The application of this thought to the subject under consideration is obvious.

It would seem that the search for a special avenue of passage of the pathologic agent from one eye to the other has not only been fruitless, but even unfortunate, inasmuch as this blinded the eyes of investigators to the more obvious solution and delayed the working out of an effective plan of treatment.

CLINICAL REPORTS OF CASES.

In a clinical and private practice extending now over twenty years I have seen six cases of sympathetic ophthalmitis. A brief history of each case I herewith présent:

CASE 1.—Mr. G., a railroad worker, was struck in the eye by a piece of iron from the head of a hammer. Six days after the accident he came under my observation and the eye was found to present a fine corneal-scar. The point of entrance of the missile, a

traumatic cataract and a moderate degree of inflammatory reaction. Magnet reaction to pain and the skiagraphs both indicated the presence of a foreign body retained within the eyeball, and it was

decided to institute operative proceedings for its removal.

The following operation was done. A corneo-scleral incision was made as for cataract extraction; small iridectomy was done; the cataract removed and a small tip of the Hirschberg magnet introduced slightly into the lips of the wound, and when the current was turned on a scale of iron immediately came to the magnet tip and was easily removed.

No vitreous was lost. The wound angles were freed from iris

tissue, and the usual toilet carried out.

Healing was not kindly; great inflammatory reaction resulted. The patient suffered intensely with pain and complained bitterly of a numb, prickling sensation over the brow, following the distribution of the supra-orbital branch of the ophthalmic division of the fifth nerve.

Between three and four weeks after the operation this man showed some slight evidence of sympathetic ophthalmitis, and in spite of the fact that the offending eye was immediately enucleated, in a few days he was in the middle of a severe attack of sympathetic ophthalmitis, which eventually destroyed his eye completely.

This case occurred some ten years ago. Rest in bed, mercury and atropia constituted the treatment, and it was entirely inefectual in staying the progress of the disease.

A retrospective view of this case in the light of a richer experience shows the weak spots in its management. While the technic of the operation for the removal of the steel was good, the method was wrong. The steel should have been removed through a scleral puncture and the cataract dealt with later on. The modern dark room and salicylate of soda treatment would have offered better chances of recovery after the sympathetic ophthalmitis had once started than that which was available at that time.

CASE 2.—Master L., aged 10, was struck in the eye with a piece of copper from an exploding gun cap, which passed through the cornea, lens and iris and lodged in the vitreous. An unsuccessful attempt was made to remove the foreign body and immediate enucleation was advised but rejected. In three weeks a sharp attack of sympathetic ophthalmitis occurred, and in spite of immediate enucleation and the vigorous application of the existing form of treatment—atropin, rest in bed, and mercury—this eye went on to complete destruction and total blindness.

In this case, as in Case No. 1, there was great pain about the exciting eye and the symptoms of prickling over the distribution of the ophthalmic division of the fifth nerve was very well marked.

There was a decided rise in temperature and well marked symptoms of general depression; strong and unmistakable evidence of

constitutional poisoning from the infection. Of course an earlier enucleation would have prevented the sympathetic ophthalmitis or the salicylate of soda treatment might have controlled it, after it was once established.

Case 3.—A more recent experience. This man had a senile cataract for which the operation of simple extraction was done. Two days after the operation a complete prolapse of the iris was found which was dealt with in the usual manner.

Severe inflammatory reaction resulted and in four weeks sympathetic ophthalmitis developed in the fellow eye. Inasmuch as there was considerable vision in the eye, from which the cataract had been removed, it was not enucleated, but the patient was put in a dark room and subjected to the salicylate of soda treatment according to the method of Gifford and made a fairly good recovery, a useful amount of vision being retained in each eye.

Case 4.—Baby W., had ophthalmia neonatorum, which came under observation at the end of the second week. At this time the cornea of the right eye was necrotic. Under appropriate treatment healing took place, and when the child was 4½ months old a Mules operation was done on account of a large anterior staphyloma of the right eye. The healing was uneventful and the cosmetic effect was exceptionally good. Nothing was heard from this eye until the child was 2½ years old, when, without any known cause, it became irritated. In the next year this was repeated several times, but always subsided under treatment.

During each of these attacks there was always manifest in the other eye marked symptoms of sympathetic irritation but no inflammatory symptoms. However, finally when the child was 3½ years old, a severe attack of inflammatory reaction occurred in the stump and sympathetic inflammation occurred in the other eye. This was not of the plastic irido-cyclitis type, but of the form characterized by modern redness of the sclera, contraction of the pupil, photophobia and lachrymation and a clearly defined ophthalmoscopic picture of optic neuritis. The stump was promptly enucleated, the child put in complete darkness and given sodium salicylate, and the recovery was prompt, complete and permanent.

CASE 5.—E. O., a mechanic, received a penetrating wound of the corneo-scleral margin, resulting in prolapse of the iris, and opacification of the lens. Exposure to the giant magnet and a skiagraph failed to indicate the retention of the missile which had done the damage. The iris was freed from the corneo-scleral wound and a small iridectomy performed. Reaction was marked, great pain and tenderness. General depression and a half degree of elevation of temperature was noticed. A moderate degree of numbness and prickling over the distribution of the ophthalmic division of the fifth nerve was observed in this case.

There was a moderate degree of photophobia and a perceptible degree of lowering of the power of accommodation of the fellow eye. Five weeks after the original injury the injured eye still presenting marked signs of inflammation, it was enucleated, and in a few days after the operation the patient left the hospital and returned home. In exactly three weeks from the date of the enucleation the patient returned with a well-marked plastic iridocyclitis, pupillary adhesions and greatly reduced vision.

A typical picture of sympathetic ophthalmitis of fairly severe type was presented by this eye. The diagnosis was made first by the history; second, the typical type of inflammatory reaction shown in the eye; third, the exclusion of all other possible causes of iridocyclitis; these included trauma, extension from surrounding areas of inflammation—rheumatism, syphilis, tuberculosis and any other possible infective process in the body, excepting that originating from the eye which had been enucleated.

I might add that the healing after the enucleation had been entirely uneventful and that the recovery from the sympathetic ophthalmitis was complete and permanent under the Gifford method of treatment.

Case 6.—W. H., a farmer, was struck in the left eye by a splinter of wood, producing a perforating wound of the cornea, and traumatic cataract. Three weeks after the injury he came under observation. The eye was much inflamed, great pain, and a moderate degree of prickling over the fifth nerve. The patient was greatly depressed, confined to bed and had temperature varying from 99 to 100 degrees F., with elevation of the pulse. A linear extraction of the swollen lens matter was performed, but was not followed by any appreciable amelioration in either the constitutional or local symptoms. The injured eye was enucleated and after a week the patient was allowed to return to his home.

In exactly three weeks from the date of the enucleation the fellow eye suddenly became violently inflamed and a few days later he was returned to me practically totally blind. An examination showed a plastic iridocyclitis of a very violent type and numerous posterior synechia. The diagnosis of sympathetic ophthalmitis was easily made by the clinical picture presented, by the history and by the exclusion of all possible causes excepting that of sympathy.

After a protracted course of heroic treatment by the Gifford method this man likewise made an absolutely perfect recovery, which since has so remained.

Cases 1 and 2 illustrate the result of treatment fifteen years ago. Cases 3, 4, 5 and 6 are illustrations of the better results now obtained by atropin, complete and total darkness, and one grain per pound of the patient's bodily weight per day of a reliable preparation of sodium salicylate.

Now in conclusion, what can briefly be said of this disease seems to the writer to be about as follows: Postoperative sympathetic ophthalmia is not an extremely rare occurrence. Second, there is a special anatomic pathologic condition, the occurrence of which in an injured eve will surely produce sympathetic ophthalmitis in the other eye. Third, the search for a special route of passage from one eye to the other is fruitless and unimportant. Fourth, the evidence of a general systemic infection being at the bottom of the difficulty is fairly conclusive. Fifth, there is a train of symptoms--objective and subjective-which are fairly convincing of the immediate probability of an impending sympathetic ophthalmitis: they are violent inflammatory disturbances in the injured eye accompanied by the evidence of infiltration in the uveal tract; clinically this is best shown by muddiness, thickening of the iris and tenderness over the ciliary region, great pain, a prickling or numb feeling over the distribution of the ophthalmic division of the fifth nerve, especially the supra-orbital branch. Constitutional symptoms, such as one would expect to find in a general systemic infection, such as general depression, malaise, loss of appetite, moderate elevation of the bodily temperature and pulse rate and later on the well-known signs of inflammation in the fellow eve. Sixth, the result of modern methods of treatment is much superior to that employed fifteen years ago.

Furthermore, it would seem to the writer that some progress can be made in the earlier diagnosis of the impending outbreak in the fellow eye by a study of wounded eyes by means of transillumination, so as to become familiar with the normal and abnormal shadows; from this method we may be able to detect the influence of the greatly infiltrated uveal tract on such shadows of transillumination. A refinement of skiagraphic technic may also offer us something in this direction.

There is also a further possibility of progress in this direction by the study of the blood conditions of patients with wounded eyeballs. Any progress toward early diagnosis in this disease will be hailed with delight by anybody who has had to deal with such distressing problems as are presented by sympathetic opthalmitis.

DISCUSSION.

DB. SCHNEIDEMAN:—The oculist comparatively rarely has the opportunity of observing the evolution of sympathetic ophthalmitis from its first inception unless fortunately it follows one of his own operations. The history of the beginning of these cases is ordinarily this: An injury of one eye comes under the care of a practitioner, usually not an oculist:

the second eye becoming involved, the case reaches the specialist, often when the disease is far advanced and frequently beyond hope of cure.

I had the opportunity of observing three cases almost from start to finish. The first, a man standing at the corner of the street. An ash cart came by and exploded a cartridge, the ball of which entered his eye and tore it almost to pieces. He was on the verge of delirium tremens at the time. We cleaned up the injured eye as best we could, but he would not consent to enucleation. Six weeks later he returned with the typical symptoms of sympathetic ophthalmia. The stump was immediately enucleated and the man made a perfect recovery. The second case followed discission for high myopia. Enucleation was here also followed by recovery, though a number of opaque spots permanently remain on Descemet's membrane. The third case followed destructive gonorrheal ophthalmia—a rare sequence. In spite of enucleation and active treatment the second eye was also lost.

Dr. H. B. Young:-I am particularly interested in this subject, because at the present time I have a case of postoperative sympathetic ophthalmitis. It came to me from an ophthalmologist in an adjoining town. The patient had an attack of gonorrheal ophthalmia, with large perforation in the left eye and small perforation in the right. He was sent home when the pus disappeared, with a large ectasia in the left and a small one in the right eye. He had a regime to follow out under the care of the family physician, who refused to take any responsibility in the matter and insisted I be called in and put in charge of the case. When I saw the case I disagreed with the régime prescribed, which included a daily walk in the open air without support for the bulging cornea, and night and morning a drop of solution, 3 grains to the ounce, of the sulphate of zinc, for which I could see no use. I said I would change the directions and keep the patient quiet for a short time with a compression bandage, and might have to make a paracentesis and possibly an enucleation of that eye. The oculist in the other city was communicated with and my alteration of the handling suggested. He protested against that and I declined to have anything to do with the case and referred it back to him. The patient returned in three or four weeks minus his corneal ectasia, which had been removed by operation—abscission. Perception of light in that eye was lost, and he had now been told that all that was necessary was a short rest and fitting the other eye with a glass. He said he did not see as well as when home before. The iris of the right eye showed a slight change in color, and, the ophthalmoscope being brought into use, I could not see the fundus as I had seen it. But after 48 hours I began to see a mass of brownish exudate coming down, and I again refused to have anything to do with the case, saying the condition was graver than before. The patient was again taken back to the original physician, and I insisted that another oculist be called in. When the consultation was had an immediate enucleation was done of the blind left eye. He was then put on immense doses of salicylate of sodium and inunctions and came back to me in a few weeks with violent iridocyclitis. This was of a unique character to me, because associated with anterior synechia. The tension increased to + 2, the cornea began to bulge, and I made a paracentesis—a very unsatisfactory paracentesis—but he never was bothered with increased tension afterward. Now, after nearly eleven months, he still has good light perception and good projection and is anxious for operative procedure.

I do not believe salicylate of sodium is the cure some people think. I believe that those cases in which we get a perfect result from its administration are not true sympathetic ophthalmitis. I still believe if we have a sympathetic iritis that enucleation hastens the trouble rather than causes

a cure—just as Mauthner pointed out years ago. I am led to this by the case the essayist to-day has spoken of. He says he made a wrong procedure in extracting the cataract and taking the foreign body out through the corneal wound (Case 1). I can not see anything to account for the trouble on that score. He would have had the same trouble had he made a scleral wound. He had a sympathetic iritis in the other eye. The pain shows this. Iridocyclitis is an insidious disease and dangerous because it does not cause pain. In Case 3 also, when he did a simple cataract extraction and had prolapse of the iris following it. Unless iris prolapse is seen within the first few hours it had better be left alone, because in the experience I have had in trying to clear up this thing I have found I get a low grade of infection which is followed by reaction to a greater or less extent; while in those cases left alone I get no reaction, but a comfortable result, and in many instances satisfactory vision. So I have given up the idea of interfering unless seen within 24 hours.

Another point I want to bring into consideration is in the case of the baby which had ophthalmia neonatorum and the Mules operation. I believe that that case was also a case of distinct trouble from interference just as the case I cited was—the ablation of the ectasia. If the eye had been enucleated and the stump left untouched—and I want to ask, did he leave the stump untouched or stitch it up?—I think he would have escaped trouble. I think there is much in this. I have made up my mind to abandon sutures in the stump.

DR. ALT:—I agree with Dr. Young concerning his case of sympathetic ophthalmia. In fact, he made several remarks I intended to make myself. I do not see why the doctor called his first case a postoperative one. It was simply sympathetic ophthalmia, which would have occurred whether he attempted the removal of the foreign body or not. The sympathetic disease was not due to his operative interference.

With regard to the cures with salicylate of soda, I wish to say that very soon after Dr. Gifford's first report had appeared I happened to be so unfortunate as to have two cases of sympathetic ophthalmia under my care. In these cases I put this treatment to the test. In both cases, while at first seeming to relieve the situation, it was of no lasting value whatever, as far as I could see. I have tried it since with no better result.

Dr. Campbell called this the "modern treatment." In the American Journal of Ophthalmology he will find the translation of a French article by myself, in which the most "modern" treatment is said to consist of injections of corrosive sublimate in very concentrated solution.

Dr. Reber:—I have had a case, 28 years of age, in a trained nurse, who eight years previously had had a violent iridocyclitis of the left eye, treated four months. After about a year a cataract began to develop in this eye. The pupil was dilated and the tension about normal when I first saw it. Pupil about 5½ mm., the lens dense, white and disfiguring; she was told she could have her choice of enucleation or extraction and that she would have to take the risk if extraction was done. This was done, and left a dense capsule, which was extricated and brought away with great difficulty. The eye healed very slowly and required about three months to quiet down. Soon after there developed a keratitis punctata in the right eye (not painful), which went on to posterior uveitis and high grade papilitis. She was put on salicylate of sodium, given inunctions, pilocarpin sweats, iodin, prayers and everything else, but in spite of our utmost efforts things went from bad to worse and she is now virtually a blind woman.

Dr. Jackson:—I would be inclined to ascribe the better results in the later cases to the fact that in the last two cases the sympathetic ophthal-

mitis developed after the enucleation of the exciting eye. A report of the committee of the Ophthalmological Society of the United Kingdom several years ago showed that cases arising after the enucleation of the exciting eye had almost always recovered—the proportion of comparatively good recoveries was large. I have seen four cases of recovery from sympathetic ophthalmitis; three were in the practice of other men and one in my own. One was the case Dr. Schneideman has related. The one in my own practice was twenty years of age. That was treated with mercury, without salicylates at all, with almost full recovery, and the eye remained useful for ten years afterward. I believe the recoveries are where the enucleation has occurred before the attack in the sympathizing eye or promptly afterward.

DB. CAMPBELL (closing):—I have never stitched the conjunctiva before or after the operation. With regard to the modern or ancient treatment, that is only relative, and I am sure that everybody will hail with delight any advance that will give us any better method of handling these cases than that we now possess.

With regard to salicylate of soda, one of the cases was an extremely violent manifestation, the worst of the series, and that one after the cataract extraction was also violent and the result from the salicylate treatment was excellent. In the one after the Mules operation, which was done on a child of $4\frac{1}{2}$ months old, the result was also very good. My experience has been very good, I think. Perhaps the cases have been favorable ones, but I have been extremely fortunate, at least, in the salicylate of soda treatment.

ON SYMPATHETIC OPHTHALMIA AFTER EVISCERA-TION, AND MULES' OPERATION, WITH A CASE.

HAROLD GIFFORD, M.D.

OMAHA, NEB.

The text for this article is furnished by the following case:

J. M., aged 45, struck R. E. with a sunflower stump about Sept. 15, 1903. He was seen by me six weeks later, with a large triangular scar from a perforating wound in the sclera, down and out from the cornea; a. c. shallow; lens cloudy; no reflex from fundus; deep congestion; projection faulty. As, in spite of treatment, the congestion continued, Mules' operation was performed December 17, a glass ball being put through an opening in the sclera above the cornea and the cornea left in place. He returned July 28, 1904, saying that the other eve which was normal when I first saw him, had become sore and the sight somewhat dim, three days previously. No premonitory symptoms nor trouble of any kind with the stump. I found the latter to be in apparently excellent condition without any signs of irritation. The left eye showed slight but wide-spread, deep congestion, iris discolored, pupil nearly secluded and yielding very little to atropin. V. with correction 20/100. The stump was enucleated at once and under active treatment with salicylate of sodium the left eve rapidly cleared up, so that at the end of the month he was able to go home with vision almost normal. He had no further trouble until Jan. 26, 1905, when his sight suddenly got dim over night, after a hard day's work. Three days later he returned to me and I found him to have acute glaucoma; cornea hazy; fundus indistinct; T. plus 1. An iridectomy promptly reduced the tension and improved the sight, his vision in May, 1905, being 20/30, a little minus. In June his tension again went up slightly and I did a sclerotomy. on July 17 he returned with the eve red and paining him slightly. V. 20/70, not improved; T. a little high; slight opacities in lens and vitreous. In September, as the tension was still slightly elevated, another sclerotomy was done. Following this, although there was no marked inflammation, the eve remained congested; a solid immovable exudate collected in the a. c. and the lens gradually became opaque. In spite of all treatment the exudate in the a. c. continued to increase and by June 8, 1906, the cornea was nearly all of a vellowish hue, only a small portion in the center being moderately clear; nothing but whitish exudate to be seen in a. c. When last seen, in 1907, globe was small and soft and light perception doubtful. (The specimen, sad to say, was lost during an office-moving.)

In this case, although the man, apparently, got over his sympathetic ophthalmia, the unusual course which the subsequent glaucoma pursued, makes me believe that it was influenced by the preceding inflammation and that if he had not had the sympathetic trouble he probably would not have lost his sight from the glaucoma.

It makes a great difference whether one of these rare accidents occurs in a man's own practice or in that of some one else. Reading about such things produces very little effect. Like lightning flashes, they do not seem worth worrying about. But when a man has one of his own patients go blind, after a somewhat unorthodox operation, it is hard to escape some remorse at not having stuck more closely to conventional lines. In endeavoring to decide whether Mules' or any other implantation operation is justifiable, I have collected the following cases of sympathetic ophthalmia after Mules' operation.

The original and famous cases of Cross (Oph. Rev., 1887, p. 236) are the following:

- 1. Mules' operation, seventeen days after wound of the eye. Seventeen days after the operation, V. of the other eye dull and eye uncomfortable; two days later "distinct sympathetic ophthalmitis." Glass ball removed at once, eye much inflamed and painful for a fortnight. Left the hospital five weeks after the removal of the ball with some congestion and irritation remaining. Later, eye normal (no V. given at any time).
- 2. Mules' operation, with a metal ball, performed three months after wound. Considerable reaction. Ball exposed through small fistula twelve days later. Ball removed at once; patient left hospital in ten days, but returned a few days later with V. equal to 20/40, slight circum-corneal congestion, sluggish pupil which yielded to atropin, "leaving slight uvea" (sic); vitreous hazy, distinct neuroretinitis. In this case the sympathetic ophthalmia showed itself twenty-one days after the operation; the symptoms subsided after ten weeks of treatment. "These cases were considered to be analagous to those of sympathetic ophthalmitis occurring after and in spite of enucleation and not caused directly by the operation." Cross does not state what was done with the stump in the second case, but apparently it was not removed.
- 3. Coleman's case (Oph. Rec., June, 1899, p. 307), Mules' operation was done six days after the injury; seven weeks later, some of the glass could be seen and edges of sclera freshened and reunited, but stitches gave away. Eight days after the second stitching, the other eye showed marked sympathetic ophthalmia. Final vision, 20/30. It is not stated just what happened to the glass ball in this case, but the context leaves little doubt that it escaped. The stump was not removed.

- 4. Faith (ibid) in the discussion of Coleman's case, refers to a case of Bettman's in which iridocyclitis followed Mules' operation, necessitating enucleation of the stump. No further particulars.
- 5, 6 and 7. In the report of the Committee on Excision of the Eyeball, etc. (Trans. Oph. Soc. United Kingdom, xviii), mention is made of Cross' first two cases, together with three more, as follows: (a) Charnley: Mules' operation about a month after wound; one month later, decided sympathetic ophthalmia with final vision 6/18; ball not taken out. (b) Cross' third case: Mules' operation three weeks after wound; 35 days later patient returned with iridecyclitis, and V. 5/60. He stated that eye got sore and dim about 17 days after the operation. Stump removed and eye gradually recovered. Two months later V. 5/6. (c) Bickerton's case: Mules' 21 days after wound; 25 days later, mild sympathetic ophthalmia set in in the other eye. Vision after a week 6/5. No further particulars nor mention of stump being touched.
- 8. Suker, personal communication to de Schweinitz (Report on Enucleation, etc., Internat. Oph. Cong., 1900): Mules' performed 18 days after wound; ten days later, iridocyclitis of other eye began. Stump enucleated, ultimate vision 20/80.
- 9. Carrow, letter to de Schweinitz, loc. cit. Mules' operation followed by sympathetic ophthalmia in the other eye. This recovered after enucleation of the stump. The original operation in this case was done for an extensive corneal and scleral staphyloma, which in itself, was not causing any signs of sympathetic ophthalmia. De Schweinitz also mentions two cases of sympathetic trouble after Mules', reported to him by Hobbs, but without enough particulars to make them available.
- 10. Thompson (Tr. Amer. Oph. Soc., x) in a discussion of Sattler's case of sympathetic ophthalmia after Frost's operation (p. 337), mentions a case observed by him at the Manhattan Eye and Ear Infirmary, where, ten days after Mules', a low grade of iritis developed and made no improvement until the stump was removed, then prompt recovery.
- 11. Byers (Brit. Med. Jour., Dec. 29, 1906): Mules' forty days after wound: two weeks later moderate serous cyclitis, followed two months later by neuroretinitis. Course prolonged, but final V. 6/9, in part. "The eye is comfortable and capable of doing a considerable amount of work." Apparently the ball was left in the stump and nothing done to the latter.
- 12. Ziegler (Oph. Rec., August, 1908, p. 310), in a discussion, speaks of a case of sympathetic ophthalmia observed by him three months after Mules'.
- 13. Goldberg (Oph. Rec., August, 1908, p. 305, and personal communication), following an injury, eviscerated eveball and implanted gold ball. Seven weeks later the other eye became inflamed and ran the ordinary course of a severe sympathetic ophthalmia; in spite of treatment and repeated operations. V. only light perception at time of discharge. (I find that this case has also been

reported at the Pan-American Congress in 1907, by Oliver, who has kindly allowed me to see his manuscript.)

Besides these cases there should be mentioned an instructive case of sympathetic irritation after Mules', reported by Linn Emerson (Oph. Rec., 1907, p. 496). His patient had serious irritation of the other eye persisting for some time after the operation, but ceasing promptly when the ball, with a few drops of straw colored fluid, was removed.

In order to have some basis for estimating the danger of Mules' operation as compared with ordinary evisceration and the Frost operation, I have searched the records for cases of sympathetic ophthalmia after these operations, with the following results:

(a) After Frost's Operation, i. e., Implantation of Some Sort of Ball Into Tenon's Capsule.

I have found only three cases of this sort; two are mentioned in the report on excision (Tr. Oph. Soc. U. K., xviii). (a) Cant's case. Frost's operation performed third day after wound; three days later, globe came out and second eye felt weak and watery; the next day, iritis which ran into typical sympathetic ophthalmia; result was not given. (b) Lang's case. Old atrophic stump removed and glass ball put in; eight weeks later patient returned with sympathetic ophthalmia; final result bad. Anterior chamber shallow, pupil irregular, V. fingers at 4 feet. The other case is that of Sattler (Trans. Am. Oph. Soc., x, 337), eye enucleated 15 days after wound, glass ball put in. Forty-eight days later, pronounced nerouritinits, with mild uveitis. Patient was helpless from loss of sight; ball and 2½ cm. of nerve removed at once; 40 days later V. 6/10.

To these may be added Davis' case of sympathetic irritation after Frost's (Jour. Am. Med. Assoc., July 20, 1907, p. 215). The patient had had a paraffine ball put into Tenon's capsule about a year before he was seen by Davis. All went well for about ten months, when the artificial eye which he wore began to turn in and the other eye began to be congested, painful and watery. This kept up for six or eight weeks, when Davis operated and found the paraffine in a single mass at the posterior end of the orbit. This was removed and the symptoms disappeared at once.

(b) Sympathetic Ophthalmia After Evisceration Without Artificial Vitreous.

The English Committee on Excision, already referred to, were not able to find any cases of sympathetic ophthalmia after the ordinary evisceration, nevertheless, some had been reported at that time and others have been reported since.

1. Dransart (Rev. gen. d'Oph., 1886, p. 505) in a discussion in the French society mentions having had one case of "transmission sympathique" after evisceration. No further particulars are given, but as he speaks of it with regret the case was probably serious and the outcome bad.

2 and 3. Schmidt-Rimpler (Deutsch. Med. Woch., xxviii, 1900, p. 451) reports the following: (a) Evisceration 14 days after wound; two years later moderate iritis, with spots on Descemet and opacities in the vitreous, V. reduced to 2/12; stump removed; final result V. 6/8. Although this case is somewhat doubtful on account of the long period which elapsed, S. says it gave decided impression of a sympathetic disease. (b) Evisceration one month after accident: 19 days later V. began to get hazy. He returned to the hospital about a month after the operation with moderate sympathetic ophthalmia, V. 1/3, final result V. normal.

- 4. Waldispühl (Inaug. Diss. Basel, 1892) mentions a case which occurred in the clinic at Basel, in which a patient upon whom an evisceration had been performed returned four months later with pronounced sympathetic ophthalmia. In spite of enucleation of the scleral stump and all the ordinary forms of treatment the condition kept getting worse; and although there is no exact statement of the final result, the eye must have been practically lost. In the enucleated stump staphylococcus albus and citreus were found.
- 5. Van Duyse (Arch. d'Oph., 1893, p. 197), in a book review, reports a case of his own in which evisceration was done four days after a postoperative iridochorioiditis had developed. At the end of three weeks sympathetic ophthalmia appeared in the other eye and it was lost, by this disease.
- 6. Forget (Arch. d'Oph., 1893, p. 693) mentions a case of optic neuritis occurring 19 months after evisceration. Result (?).
- 7. Hotz (Tr. Oph. Sec. Am. Med. Assoc., 1893, p. 93) reports a case of mild optic neuritis occurring about three weeks after an evisceration and recovering without the stump being removed.
- 8. Neiden in a report to Pflüger (Corrbl. f. Schweizer Aerzte, 1896, 1) describes a case in which he performed evisceration four weeks after a wound; 14 days later sympathetic ophthalmia appeared; result not given.
- 9. DeWecker (Ann. d'Occulist., October, 1899, p. 197), evisceration nearly three months after wound, three weeks later sympathetic ophthalmia developed, stump enucleated with as much as possible of the nerve, but "nothing modified the pernicious and destructive course of the disease."

There remains to be mentioned an isolated and doubtful case of

(c) Sympathetic Amblyopia After Ordinary Evisceration.

Reported by Burchardt. An evisceration was done and the patient returned after two years with the other eye objectively entirely normal, but with V. only 1/21. The stump was removed and vision arose to 3/12. This case is doubtful from the fact that there is no record of the vision before the evisceration, and it should also be considered that the pain in the head and orbit (and, perhaps, also the poor V.) of which the patient complained may have

been caused by her habit of probing the lachrymal canal daily, and apparently leaving the probe in through the day. This practice was stopped at the time the stump was enucleated.

De Schweinitz (loc. cit.) mentions two cases of sympathetic irritation after ordinary evisceration, one by Casey Wood and the other by Suker, in which troublesome symptoms persisted for some time, but gradually disappeared without the stumps being removed.

To sum up, we have fourteen cases of sympathetic ophthalmia after Mules', nine after ordinary evisceration and three after Frost's operation.

With regard to the severity of the disease: Of the cases after Mules', vision of 20/30, or better, was obtained in nine cases; in two, the final V. was 20/60 and 20/80, respectively; in two, it is unknown; while in two of the eyes the sight was nearly destroyed.

In cases after ordinary evisceration, the final vision was unknown in three. In two it was normal; in one it was 6/8; while in three the sight was lost.

In the three cases after Frost's, the outcome was uncertain in one. In one the final vision was 6/10; and in one, fingers at four feet.

In the great majority of all these cases the operation was done for persistent inflammation, following some wound, and of most of these it may be said that the sympathetic ophthalmia might have occurred just the same, even if simple enucleation had been performed; but there remain seven cases to which it does not seem reasonable to apply this explanation. These are: (a) The case of Carrow, where Mules' was done for a staphylomatous, but not inflamed eye, and (b) that of Lang in which an old, atrophic stump was enucleated and a glass ball put into Tenon's capsule; (c) my own case in which the disease appeared more than seven months after Mules'; (d and e) those of Forget and Schmidt-Rimpler in which sympathetic ophthalmia appeared 19 months and two years, respectively, after ordinary evisceration; (f) that of Cant in which a Frost's was done three days after the injury and the sympathetic ophthalmia appeared four days later; (g) that of Van Duvse in which, to save the patient the pain of panophthalmitis, an ordinary evisceration was done four days after an infectious iridochorioiditis following cataract extraction had set in. In the first five of these and, perhaps, in the sixth, the evisceration stump itself may reasonably be held responsible for the sympathetic ophthalmia, while in the last two it is almost certain that an enucleation would have prevented the trouble.

In view of the uncertainty as to the comparative frequency with which enucleation and its substitutes are performed, there is no use in pretending to anything like accuracy in estimating their comparative dangers, but considering the immense preponderance of enucleation (following which about thirty-five cases of sympathetic ophthalmia have been reported since evisceration came in). I think it is clear that the statistics, as well as theoretical considerations, indicate that enucleation as a prophylactic against sympathetic ophthalmia is somewhat surer than any operation in which part of the eyeball, or any foreign body, is left in the orbit or scleral cavity. I think it also certain that ordinary, or simple, evisceration is safer than Mules' or Frost's operation.

I do not think it likely that the publication of these figures will make much difference in the number of Mules' and Frost's operations that are done. The argument will be used that an occasional sympathetic ophthalmia should no more set our faces against these operations than that the blindness from quinin and salicylate should prevent our using these drugs, but the parallel does not hold. With quinin and salicylate we save many lives and eves, while with the substitutes for enucleation we run a slight risk of losing sight for the results obtained, by enucleation, careful prothesis and the wearing of glasses to minimize the deformity, is very slight. To be frank, I do not think that my own practice would be much influenced by this series of cases if they were reported by some one else, but having had one of these accidents myself, I should feel like a criminal if I were to go on doing Mules' for Frost's operation, and should have a second patient go blind after one of them; and I should throw over the simple evisceration also if I did not believe it to be slightly less likely to cause death, than enucleation is.

In conclusion I submit the question, "Is it more than fair to our patients to, at least, give them the chance of deciding for themselves whether they prefer to incur a slight risk of losing sight for a slight improvement in looks?"

DISCUSSION.

DR. VAIL:—I had an experience similar to the one the author relates, which I will describe. The patient was shot at a distance of sixty feet by a load from a shotgun in which was bird shot. One shot penetrated the eye and caused hemophthalmos interna and total loss of vision. It was a Cincinnati hospital case and I had absolute control of it I treated it expectantly for four weeks, when I decided to enucleate. I implanted a glass ball in Tenon's capsule and was careful not to use a large ball to produce tension of the tissues. The healing was by first intention and no reaction followed the operation. Where a large glass ball is used its implantation is frequently followed by great chemosis, but there

was none in this case and the result was beautiful. The man was dismissed from the hospital five weeks after, wearing a glass eye and muca pleased with its beautiful appearance. Five weeks after the operation he appeared at my office, saying he had had an attack of blindness, which lasted about an hour, and had not fully recovered. Examination revealed vision of 20/50 and partial central scotoma. I examined for toxic conditions and intranasal conditions and everything that would account for it. but could find no cause and was inclined to think it was hysterical. The ophthalmoscopic examination was negative. The vision was normal at the periphery and there was partial scotoma at the center. There was no sign of iritic or pericorneal congestion or any other condition in the eve that would indicate an oncoming attack of sympathetic inflammation and I could not believe the glass ball had anything to do with the trouble. However, I sent him to the hospital, where he went under the service of Dr. Sattler, who was then on duty, and four days later, when I saw him in consultation with Dr. Sattler, I found a case of intense plastic neuroretinitis and iridocyclitis. The man was entirely blind; the remaining eye seemed absolutely gone. I advised the removal of the glass ball and the exsection of as much of the optic nerve as could be taken. We had little hope, but this operation was done, and 10 or 15 mm. of the nerve was removed, local antiphlogistic measures were employed and vigorous antispecific treatment instituted. The case went to rapid recovery, the exudation entirely disappeared, and a month later when I called to see him his vision was 20/20. What the ultimate result is I am not able to say. Most likely he has an atrophy of the optic nerve secondary to the intense inflammation of the nerve present at the time of the attack. It was a genuine case of sympathetic ophthalmia occurring five weeks after the enucleation of the blind eye and the implantation of the glass ball in Tenon's capsule. Dr. Sattler reported the case before the American Ophthalmologic Society almost three years ago.

Dr. C. S. Means:—This paper has been extremely interesting to me for the reason that it has fallen to my lot to operate a number of these cases. You may call it fortunate or unfortunate. The only unfortunate case that I have ever had is one reported in Dr. Gifford's paper. The operation was done about twelve years ago. The young man was a student in the State University. He was very sensitive over a very much deformed eye, due to a large staphyloma. He consulted me and I advised a Mules' operation. The operation was done, and special care was exercised that none of the chorioid should be allowed to remain. The end of the optic nerve was also carefully curetted. The result was all that any person could ask for the first three months. He had splendid motion and was very much elated over the outcome.

About the end of three months there was some irritation developed in the operated eye and also some lachrymation or irritation in the opposite eye. A buried suture was removed, and for a time we thought this was the exciting cause, but in a short time the irritation returned. Every time the shell was worn the eye would become irritable. We tried all manner of lotions and different kinds of shells, and allowed the eye to rest by leaving the shell out for a time. He would then get better, but immediately on replacing the shell the irritation would return.

The young man went to college in another university and fell into the hands of the physician who reported the case. I received notice that he was having sympathetic inflammation. I telegraphed to enucleate the old stump at once, which was done.

Now the strange part of this record. After the eye was enucleated, the irritation was no better than before. Every time the shell was inserted

he would have the irritation in the opposite eye. The last time I saw him there was no trouble at all with the good eye, but he was wholly unable to wear a shell. A few days ago I heard from him and he is still in the same condition. Thus, after twelve years, he is still unable to wear an artificial eye on account of the irritation it produces.

Now the question comes, Would any other operation have been better for this young man? Had I enucleated at first, the same irritation that is now present might have been there. I do not believe that the Mules' operation has anything to do with the irritability of the other eye.

TWO CASES OF PARINAUD'S CONJUNCTIVITIS.

C. BARCK, M.D. ST. LOUIS.

Case 1.—The patient, a telegraph operator from Anna, Ill., was a strongly built man, 34 years of age. The affection commenced without any known cause about three weeks before I saw him. The left eye became red, the upper lid swollen, and a moderate discharge commenced. Soon afterward the pre-auricular glands began to swell. Patient was treated in Anna, but as the symptoms increased

steadily he was sent to St. Louis.

I found a moderate swelling of the upper lid. There was an enormous chemosis, more pronounced in the temporal than in the nasal portions. In the chemotic conjunctiva there were a number, about eight or ten, yellow roundish spots, not fully the size of a pinhead. The upper fold of transmission was enormously thickened and inflated, such as we see it in acute trachoma. But the picture of the surface was entirely different. There were a number of excrescences, looking like flat pressed polypi; the largest one, not far from the outer corner of the lid, was about three lines long and two lines wide; then there were present yellow-whitish infiltrates looking somewhat like pus, ½ to 1½ mm. in diameter. They were arranged in two irregular rows, about twelve in number.

The conjunctiva of the lower lid was only slightly inflamed; it

did not show any infiltrates or polypoid vegetations.

The discharge was slight, of a muco-purulent nature, the cornea

clear. Vision = 6/5, after correction of his myopia.

The entire left half of the face was enormously swollen so that patient was rather disfigured. On closer examination the swelling was found to be due to two separate masses of enlarged glands: the upper one the pre-auricular gland, the lower the submaxillary and cervical glands. These two were separated somewhat from each other, each one being as large as an apple.

The enlarged pre-auricular gland was softened and fluctuation could be distinctly felt. It was therefore opened; a small amount of pus only was found in the center of broken-down tissue. Some of this was removed with the curette for microscopic examination.

The wound was drained.

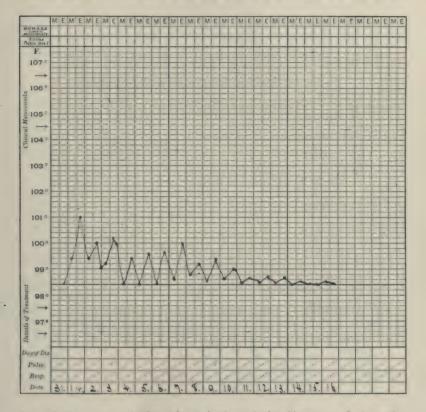
On the following day all the excrescences were removed with scissors and a number of the yellow infiltrates were punctured and afterward squeezed out with the trachoma forceps. There was hardly any reaction. The remainder of the yellow infiltrates were treated in the same manner one week later. The improvement was a very rapid one; it is best shown by the two drawings, which I pass around and which have been made at an interval of two weeks.

After the surgical treatment daily applications with a 1 per cent. solution of sulphate of copper were made. Internally the patient

was given arsenic and iron.

Patient had an elevated temperature when he arrived. The fever was highest in the afternoon; it usually ranged around 100; the highest temperature, reached on the second day, was 101. It lasted from one to two weeks, subsiding gradually, as shown on the accompanying chart.

After three weeks he went home and the treatment was continued there. Two weeks later the wound was closed and the swell-



ing of the pre-auricular gland had entirely disappeared, but the submaxillary and the cervical glands formed a thick mass. There was only a slight thickening of the conjunctiva left and hardly any discharge. After another three weeks the conjunctiva had entirely returned to the normal and a moderate swelling of the cervical glands was the only remnant. General health very good.

Etiologically the case is as obscure as most of the others reported. The patient, as mentioned, is a telegraph operator and had nothing whatever to do with animals. He himself is unable to assign any cause for the affection. About half of all the cases reported until now occurred in people who handled domestic animals, especially

cattle; the other half had vocations in which they did not come in contact with them. It is, therefore, still an open question whether the supposition of Parinaud, that we have to deal with an infectious conjunctivities of animal origin, is correct.

The discharge from the conjunctiva and the material pressed out of the infiltrates was examined repeatedly for micro-organisms by myself as well as by Dr. T., a competent bacteriologist. None could be found in the smears. Dr. T. also made cultures from the infiltrates on agar-agar. The tubes remained sterile. In about two-thirds of the cases reported microscopical examinations and cultures have been made. All of these proved negative as to the findings of micro-organisms, with the exception of two. Stirling and McCrea found during twenty-five consecutive days the Klebs-Loeffler bacillus in the conjunctival sac, but not in the pus from the glands. Scholtz found a short bacillus whose poles stained better than the center and which resembled somewhat the pest bacillus.

The histological examination gave more uniform results. The picture of the excised polypoid vegetations and small portions of the conjunctiva showed infiltration with lymphoid cells, proliferation of the connective tissue and cell necrosis. Giant cells were not found, but the microscopic structure is similar to that of tubercles, and some authors, as Hoor, express the opinion that this affection

might be a benign form of local tuberculosis.

Reis, from his inquiry, came to the conclusion that we have not to deal with a local process but with a constitutional disease. In sections he finds a sharp distinction between the superficial layers, which consist of lymphocytes, epithelial cells and only a few plasma cells, while the deeper layers are composed nearly exclusively of plasma cells. And by this finding he explains the clinical fact that Parinaud's conjunctivitis heals without the formation of scars in the conjunctiva, contrary to trachoma, in which the plasma cells become transformed into connective tissue. This view coincides with the one of Goldzieher. This author had described as early as 1882 a rare affection which he termed "Lymphadenitis Conjunctivæ," and a second case under the title "Das Lymphom der conjunctiva" in 1893. Goldzieher considered these cases a constitutional affection. From the description it is evident that this socalled lymphadenitis is identical with the affection for which the name Parinaud's conjunctivitis has been universally accepted.

We are, therefore confronted with three opinions as regards etiology: Local tuberculosis, a constitutional disease, swi generis, a zoonosis of obscure nature. The first view seems to be the least tenable. Tubercle bacillis could never be demonstrated. The clinical picture differs materially from the well-known one of conjunctival tuberculosis. There are no ulcerations, and there was in all instances a complete restitutio ad integr. without scar formation.

Which one of the other two will prove to be the correct one is to be decided by future investigation. Personally I incline more to the view of Parinaud, that we have to deal with an infectious disease, leaving it open, whether of animal origin or not. For the entire clinical picture is that of an infection of the glands by way of the conjunctiva.

This clinical picture is quite uniformly reported. In all instances the affection was one-sided. The character is a benign one, as far as complications of the cornea are concerned. In one instance only this became affected by small superficial ulcers. Another important factor is the tendency to self-limitation of the disease. In a number of cases recovery took place without any treatment. In others different astringents or caustics seemed to act beneficially. But some exceptions to this rule are also met with. Jocgs reports a case where the upper lid was enormously swollen and ptosis existed for over three months, and as the applications with the usual caustics gave no improvement, he used the galvano-cautery twice, at intervals of eight days. Then slow recovery took place. Bernheimer also saw a case, which proved obstinate to all medicinal treatment for months. It was this case where the cornea became affected by marginal ulcerations and superficial opacities. Bernheimer finally made an excision of a part of the conjunctiva of the upper lid and the tarsus. The tarsus itself was found intact on histological examination. In all other cases the recovery was a complete one; the conjunctiva returned to the normal without the formation of cicatricial tissue. Considering the enormous infiltration at the height of the affection, this is certainly a remarkable fact.

An elevation of temperature has nowhere else been mentioned. I believe that it would have been found if the temperature had been taken in the other cases, and I consider it another point which speaks in favor of the infectious origin of the disease.

As regards the treatment, the different astringents or caustics have been used with seemingly equally good result. If I recommend the procedure I used, I do so because it seems to me that the course of the affection was materially shortened by it. The change within two weeks, as shown by the pictures, is certainly a considerable one. Whilst the use of the trachoma forceps readily suggests itself, it seems that nobody has used it before on this affection. Spratt recommends excision of the nodules, followed by suture of the conjunctiva. If there are a large number of these present this is a tedious procedure and the expression certainly is more simple and

quicker. Arsenic preparations have usually been administered. The glands in my opinion should only be incised if there is a definite fluctuation present.

CASE 2.—The second case could not be observed very closely. It was a clinical patient and was seen a few times only. He was a young man of 18, a clerk, the left eye being affected. Etiology ob-He had been treated elsewhere, the disease having commenced about two months prior and being evidently on the decline. The conjunctival and glandular symptoms were typical, although only moderately pronounced. It did not come to suppuration in the pre-auricular gland. He was seen only a few times; no slides or cultures were made.

Hoor, in 1906, collected forty-four cases from literature, including his own. Since then five cases have been added, with my two making a sum total of fifty-one. Spratt has given a summary of thirty-four cases in regard to: Eye affected, sex, age, locality, season, duration, suppuration of glands, etiology. A review of all the cases shows that the possibility of infection through animals existed in about 50 per cent. The bibliography which I give consists of thirty-five communications.

BIBLIOGRAPHY.

- 1. Goldzieher: Lymphadenitis conjunctivæ, Centralblatt f. Aug., 1882, p. 821.
- 2. Parinaud: Recueil d'opht., 1889, cited by Matys.
 3. Goldzieher: Das Lymphom der conjunctiva, Wiener med. Woch., No. 32, und Med. chir., Presse 10, 1893, and Centralbl. f. Aug., 1893, p. 112.
 4. Castel: Lymphadenome de la conjunctive, France med., 1894, Nr. 4, p. 56.
 5. Miller: Parinaud's conjunctivitis. Ophth. Record, October, 1897.

 - 6. Gifford: Five cases of Parinaud's conjunctivitis, Am. Jour. of Ophth.,
 - 7. Darier: Conjunctivitis de Parinaud, Clinique d'Opht., 1903, p. 304.
- 8. Jogos: Un das de conjunctivite infectieuse de Parinaud, Clinique Opht., 1903, p. 303.
- 9. Chaillous: Contribution a l'étude de la conjunctivite infectieuse de Parinaud, Annal d'Oculist, 1904, p. 5.
- naud, Annal d'Oculist, 1904, p. 5.

 10. Verhoeff and Derby: Archives of Ophth., 1904, vol. xxxiii, No. 4.

 11. Stirling and McCrea: Montreal Med. Jour., 1904, vol. xxiv, p. 431

 12. Goldzieher: Ueber die sog. Parinaud'sche Kraunkheit.-(Ungarisch). Szemeszeti lapek., 1904. Nr. 19.

 13. Matys: Zeitschrift f. Augenheilkunde. 1904, Okt., S. 557.

 14. Posev: Parinaud's conjunctivitis, Ophth. Record, 1904, p. 511.

 15. Stirling and McCrea: A Case of Parinaud's Conjunctivitis, with Pathological Report, Ophth. Review. 1904, p. 283.

 16. Thompson: Parinaud's Conjunctivitis, Ophth. Record, 1904, p. 512.
- Thompson: Parinaud's Conjunctivitis, Ophth. Record, 1904. p. 512.

- 16. Thompson: Parinaud's Conjunctivitis, Ophth. Record, 1904, b. 512.
 17. Werner: Lymphoma of the Conjunctiva, Ophth. Record, 1904, p. 81.
 18. Salva: Dauphene Medical, 1904. xxviii, pp. 61-65.
 19. Streatford: Lancet, 1904. Oct. 15. p. 1107.
 20. Dunn: Virginia Med. Semi-Monthly, 1904, Dec. 9, p. 402.
 21. Cascar: Ein fall von Parinaudsche Konjunctivitis, Centralbl. f. prakt. Augenbelikunde, 1905, Dez.
- 22. Goldzieher: Ueber Lymphom Konjunctivitis, Centralbl. f. prakt. Augenheilkunde, 1905, January.
- 23. Griffin: An instance of Parinaud's Conjunctivitis, Ophth. Record, 1905,
- 24. Posey: A case of Parinaud's Conjunctivitis, Am. Jour. Med. Scien., 1905, February
- 25. Scholtz: Ueber eine der Parinaud'sche Konjunctivitis æhnliche Binde-hauterkrankung mit positiven bakteriologischen Befund. Arch. f. Augenhelik., 1905, lili, S. 40.

26. Verhoeff and Derby: Klin. Monatsbl. f. Augenheilk., 1905, xlili.

27. Ellett: Ophth. Record, 1905, January, p. 11.
28. Bernhelmer: Ein Beitrag zu Parlnaud's Conjunctivitis, Klin. Monatsbl. f. Augenhellk., 1906, S. 253.

29. Demicheri: Conjunctivitis de Parinaud, Arch. de Oftalm. hispaneric, 1906,

30. Hoor: Die Parinaud'sche Konjunctivitis, Szemeszeti lapok Nr. i, and Klin. Monatsbl. f. Augenheilk., 1906, S. 289.

31. Little: On Parinaud's Conjunctivitis, The Ophthalmoscope, 1906. p. 681.
32. Reis: Ueber die Parinaud'sche Konjunctivitis, zugleich ein Beitrag zur Plasmazellenfrage, v. Graefe Arch. f. Ophth., lxlii, S. 46, 1906.
33. Scholer: Ein Fall von Parinaud'sche Konjunctivitis, Centralbl. f. prakt.

Augenheilk., 1906, S. 362.

34. Shoemaker: Parinaud's Conjunctivitis, American Jour. of Ophth., 1906, p. 363.

35. Spratt: Ein Fall von Parinaud's Konjunctivitis, verbunden mit Erythema nodosum und Tonsilitis, Arch. f. Augenheilk., lvi, S. 379, 1906.

DISCUSSION.

Dr. Alt:-I wish to state that I have had occasion to examine histologically the nodules that were excised from such conjunctivæ, and that I was also absolutely unable to stain any particular micro-organism. If there is one it is too small to be seen by our present means. Otherwise the histological picture was as described by the essayist.

ANALYTICAL DESCRIPTION OF THE EYE AS AN END ORGAN.

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In forming conclusions, either by experiment or deduction, one must be reasonably informed not only as to the subject at hand, but also as to that which may in any way pertain to or influence it. The scope of this paper being a very wide one, it will be necessary in referring to conditions, voluble in themselves, to condense much into a single statement which, from its briefness, may appear dogmatic, but which is asserted only after due consideration of that condition in detail.

A description of the eye as an end organ must necessarily be analytical, because conclusions can only be arrived at by dissecting that which in any way might tend to combat the conclusions formed, and the writer in doing this asks that each subject in turn as it is concluded be held in mind, not as stated, but in the concrete which the brief statement hopes to convey.

As to what relation the eye as an end organ bears to the body movement may in a measure be made apparent by the consideration of that function (?) of the eye known as projection, wherein the depth and distances of objects, as they appear in the field of vision, are estimated, as induced by the perspective. Projection is facultative, a faculty which the human family is the slowest of all forms of life to acquire. It is the lack of this faculty that makes an infant reach in a hesitating manner for an object held before it. It has no conception of the distance and extends the arm slowly, expecting contact at any place prior to full extension, and then there is a slide on the floor or a step nearer and the process is repeated. It is not until the arm is fully extended that it knows the object is beyond its reach, and after obtaining it is brought close to the face, inside of the visual angle for inspection, which is especially interesting in view of the fact that the converging powers of a baby are limited—a new-born infant having no powers of convergence at all. It is interesting to note, by way of comparison, how other forms of life in which projection is essential only to near objects, such as, for instance, a chick will pick up the minutest objects with unerring accuracy within a few days after breaking its shell.

In answer to the possible criticism that a baby has not learned to co-ordinate, I would say that the faculty of projection must be acquired first. That this is true is evidenced in the faulty co-ordination, which lasts for several years, in children blind from birth, as in ophthalmia neonatorum.

It is this estimation of distances, as induced by the perspective, that places non-seafaring persons at a disadvantage when the captain of a steamer asks the distance of an object at sea. There being no perspective, judgment is at fault, and that which appears to be ten miles away the captain smilingly states to be probably thirty miles. It is this faculty of projection that sends an increased impulse to the leg muscles for a high step or enables us to prevent our stepping into a suddenly seen mud puddle. Projection once acquired is accurate and at no time in life is it at fault, except it be from some inco-ordination of the ocular muscles which are in no wise exempt from the same influences affecting other muscles of the body. This inco-ordination need not be excessive to establish false projection. There is no double vision, nor is the deviation apparent to the observer. Normally the eyes are in a state of perfect muscular equilibrium, which any physician may readily ascertain by the simple experiment of covering one eve with a piece of cardboard so that it can not see an object brought to within thirty centimeters of the other eve. If the ocular muscles be normal, the eve behind the screen will retain its relatively adjusted position for the object although it no longer sees it. If there be a disturbance of this muscular equilibrium, the covered eve will rotate from the correct adjustment, in varying degrees, in some direction—say outward; this is made more manifest on the quick removal of the screen, when the eve will be seen to make a movement inward, an action necessarv to regain single or binocular vision. In making this redress movement to prevent double vision, the nerve impulse sent to it is in access to that necessary to bring it to its relative plane; consequently the movement exceeds the mark, and the error is momentarily reversed. In a condition of this kind, if the error be sufficient, projection for near points is at fault until the error is corrected. It is on this fact that I wish to emphatically state that, there is no successful compensatory action of the ocular muscles.

The complexity of the eye muscles in their anatomic relation and their intricate workings as influenced by that keyboard of complex, multiple nerve centers, makes them more than usually interesting. The same relationship has no duplicate in any other series of muscles in the body. Flexors and extensors of extremities are always antagonistic, yet, in the eye, they may be said to unite in securing a desired movement. The internal recti turn the eyes in, and might, therefore, be called the flexors. The external recti turn the eye outward and might be called the extensors. In directing the eyes to the right, the external rectus or extensor of the right eye, acts in unison with the internal rectus or flexor of the left eye. In the simple act of convergence, which occurs thousands of times a day, both interna work together and also at the same time the inferior oblique muscles come into play, and the muscles of accommodation and the sphincter pupillæ are rendered active.

In such an action of combined influences, so delicately adjusted, successful compensation is impossible, and while compensation may be the rule in other organs of the body, it is not applicable to the ocular muscles.

The brain centers controlling the eye muscles may be divided into two groups—voluntary and involuntary: "One group is found in the cortex, and consists of nine distinct centers. In this group are two more centers, making eleven in all, but these two are connected with muscles within the eye, viz., the Muller muscle in the ciliary body and the sphincter of the iris, and will not be specifically studied in this paper. The second group is located at the base of the brain, and consists of twelve distinct centers. In this group are four more centers, making sixteen in all, but these four are connected with the muscles within the globe already mentioned, hence, they will be passed without further mention.

"The first cortical center is connected with two superior recti by means of two bundles of fibers, both bundles passing through the first basal center on the same side, the one to be distributed to the superior rectus of the corresponding eye, while the other bundle of fibers crosses to the first basal center on the opposite side, thence on to be distributed to the superior rectus of the other eye. Throughout their entire course these fibers are insulated, even in that part which passes through a basal center. When volition unlocks the first conjugate center, the discharged neuricity goes only to the two superior recti, and in equal quantities. If the tonicity of the one muscle equals the tonicity of the other, the upward rotation of the one eye will be the same in rapidity and extent as that of the other."

In this study of ocular centers by Dr. Savage, he gives the distribution of the fibers to all of the ocular muscles and their individual action. That which is especially interesting is the specific

^{1.} Quoted from "The Voluntary and Involuntary Centers Controlling the Ocular Muscles." G. C. Savage, M.D., JOURNAL A. M. A.

statement that throughout their entire course, these fibers are insulated. The sheath of a nerve is the insulation in its ramifications throughout the body and it is interesting to note that in the brain, where this sheath ceases, the insulation is given to the individual fibers, and in a condition of this kind one must regard the entire nervous system of the body simply as a system of conduits for the transmission of energy to the periphery. Dr. Savage's article is quoted because it justifies my argument and that he applies the term "neuricity" to energy, which gives me a precedent for a term applied to a specific something defining energy, on which the deductions of this paper are based.

Though there is a dissociation between volition and energy, neurologists make no mention of it. Energy is latent, whether it be steam, compressed air, electricity, or what not, and it remains latent until released. The locomotive is impotent until the throttle is pulled open. The blast must be ignited before its energy is made manifest and the energy necessary for the movement of the body is subject to our volition and is latent until released by our caprice. What greater proof is needed of a dissociation between volition and energy, and the very apparent fact that no matter what degree of impairment to the energy may be, volition is unaffected and continues to discharge energy in the maximum degree, as if unaware of the diminished quantity. Volition is the expression of the intelligence-energy is kept in storage until it is transmitted voluntarily to the extremities through the nerves, which are in no way responsible for the degree of that energy. Energy has nothing to do with the nerve, which can only convey it, or the muscle which receives it; the sole concern of the nerve is its conductability, so it may properly convey energy in whatever degree liberated.

The attention of the body organs is not confined to the heart and lungs. The stomach's intake of food excites a flow of gastric juice. The partly digested food as it passes into duodenum, excites the liver and pancreas to secrete and as it passes on into the intestines, its presence alone excites peristalsis. What better proof is needed of the automatons of the internal organs than is shown by the unconscious, immediate response of each individual organ to the unconscious, irritative excitation by each other's product. While the constant, involuntary draft upon reserve energy for the consummation of each organ's function is relatively small, when compared to the amount voluntarily expended on bodily motor appliances, they must be and are necessarily the first to suffer in incipient neurasthenia, when, from the absolute dissociation of

rolition and energy, that energy, much limited in supply, is voluntarily released to motor muscles in excess of production. In true impairment of energy, all the body must necessarily suffer and isolated groups of symptoms need no special classification. Reflexes are common and organs, non-pathologic, may become functionally deranged, the symptoms ceasing on the correction of errors in distant organs, probably not on account of the particular organ in itself so much as the saving of energy resulting from the correction of the error which was being unconsciously expended in the unsuccessful attempt to compensate.

Dr. Clement R. Jones,² of Pittsburg, reported four cases of "neurasthenia gastrica" and concluded that neurasthenia gastrica, or nervous dyspepsia is frequently due to, or complicated by eyestrain. Other gastric disturbances, he states, are sometimes aggravated by eye-strain, and when eye-strain is the cause of gastric symptoms, the relief by proper refraction is prompt and satisfactory.

Dr. R. D. Clippinger believes that eye-strain often produces all the symptoms of an old so-called gastritis.

Dr. Mark D. Stevenson finds that very many patients are relieved of nausea and vomiting by the wearing of proper lenses.

Dr. George Sprague holds that so-called gastric disturbances in neurasthenia are very often round-about reflex disturbances due to vertigo; in one case a lack of equilibrium due to a visual defect—in some other case not.

At 45 years, the patient seeks the ophthalmologist for presbyopia. Is this stiffening of the lens an exception of all body tissues? Does not the gynecologist teach a "climacteric period" and the neurologist a condition of "neurasthenia"? Is there not a general, non-pathologic sclerosing of all tissues of the body at 45, and that the energy, though it be diminished in quantity, may be sufficient to meet the requirements of the new conditions, were it not for this utter disassociation of volition and energy, which is totally disregarded by the individual?

In briefly considering neurasthenia, I wish to exclude the various nervous states prodromal to the fully developed psychoses, such as the prodromal or incompletely developed periods of dementia præcox and paranoia, for the eye defects found in these conditions are dependent upon central cell degeneration.

For the purpose of this paper it will be sufficient to classify the symptoms into four groups: Sensory, motor, psychic and somatic. In incipient neurasthenia, the sensory predominate and express

^{2.} JOURNAL A. M. A., Nov. 17, 1907.

themselves in a generalized fatigue, a fatigue which becomes accentuated and finally pathologic. With this generalized fatigue, there may also be a localized fatigue, such as headache, backache, etc.

The motorcycle consists of muscular fatigue, muscular weakness or a tendency to muscular exhaustion, the result of deficient innervation and finally disturbance of the sexual functions which can only be interpreted as symptomatic of exhaustion.

The psychical disturbances are first, a diminished capacity for sustained mental effort. Secondly, there is diminished spontaneity of thought, and this, like the failure of the power for sustained attention or sustained mental effort, is only another sign of fatigue.

When we turn our attention to the somatic symptoms we note especially atony of the digestive tract, atony of the circulatory apparatus, disturbances of the secretions, etc. Many other illustrations might be given. Suffice it to say that the picture of fatigue, both as regards primary and secondary symptoms, is equally well illustrated by the phenomena presented by the motor, the sensory, the psychic, and the somatic symptoms.

The symptoms of neurasthenia, when regarded as a whole, seem hopelessly multiple and complex and to go into the various phenomena as expressed by individual organs, would consume endless time. Let us strive to then realize that all of these symptoms, whether they be sensory, motor, or somatic, are in no way pathological and while they are functional and the secretions of organs are deranged, this condition is in no way dependent upon the organ itself, except through its inertia from curtailment of energy, and the treatment in a condition like this is rest. To expect a cure by applying the whip to sleeping organs, such as depleting a torpid liver or massaging a muscle whose inertia is simply symptomatic, is, to say the least, unscientific.

In making a general survey of this special classification of neurasthenia, it might be summed up in a single sentence, not as innervational paralysis, for all paralyses are pathologic, but as an innervational inertia of the entire body, for to the above classification we must add the hair, which loses its luster and falls out, the skin, which is harsh and sealy and the nails, which become brittle.

Neurasthenia is a misnomer. The exhaustion is psychical, not neural, and the cure of this most lamentable and least considered condition of terminal manifestation must necessarily be dependent on the curtailment of energy, and not on massage of the extremities, or any other treatment that is directed only to the symptoms. *Does*

the electrician fix the hundreds of trolleys that cease to whirl when the traction company's dynamo stops?

The eye muscles are subject to the same influences that affect the other muscles, and when we realize that when these muscles are at fault, body movements become impaired through resultant false projections, they become no less important.

But let us go a step further and shear the eye of its complex extraocular muscles with their multiple centers, and exclude from further consideration its inco-ordinated movements from innervated, spastic motor appliances, so that we may be in a position to analyze the eye with no other attachment than the optic nerve, which is neither motor nor sensory, and is nothing more than an extension of the brain from the inaccessible skull to the periphery, with a camera attachment to receive impressions.

With the histological anatomy of the optic nerve well in mind, is it, as a whole, more than a continuation of the retina in the form of a cable to the brain? With all our study of the retina, are its rods and cones more than the terminal ends of this cable of fibers, and are its eleven layers more than the substantia propia to properly support and present these terminals, end on, so that they be in a proper position to receive impressions? Have we not in the study of integral parts, in the tracing of fibers, in the location of centers, formed hypotheses of that integral part's function, which, when studied alone, may look logical, but when considering the eye as a whole, are not even plausible, much less hypothetical, much less logical?

Among the hypotheses formed relative to the function of the retina, which have gained credence from persistent repetition, is that of the power of differentiation, a distinction that no physiologist has ever conceded to the terminal of any sensory nerve of the body. Physiologists teach that heat, cold, pin pricks, cuts, oleaginous substances or water, as recognized by the hand, are differentiated psychically. Ophthalmology teaches that color and form are differentiated by the terminal fibers of the optic nerve, the Ophthalmology does more; it inconsequently takes cirretina. cumscribed concentric layers of optic nerve fibers, and endows them with an intelligence to discern respectively green, red, blue, yellow and white, designating each in turn as respective fields for said color. In addition to this, it grants to each of the said fields the remarkable faculty of differentiating any compound of its own color or any compound of the neighboring field's color. Thus, the field for green recognizes red and differentiates any compound of that color and does this regardless of the fact that these two colors are antagonistic or complement colors. Having accepted this color hypothesis it becomes necessary to make some provision for the perception of form, in contradistinction to that of color. In doing this, ophthalmology concedes the perception of form in that portion of the retina occupied by the color fields and also beyond them to the extreme periphery, and does this notwithstanding the fact that most forms have colors; as, for instance, a tree with its green leaves.

The retina receives the impression of that which is before it as helplessly and as ignorantly of what it may be, as the mirror, which reflects that which is before it, but which has no way of expression and the retina nor the optic nerve has any power of differentiation or elimination, nor can the retina or the optic nerve in any way influence that impression, which is simultaneously reflected at its distal end; whether that impression be a broom, an umbrella, an icicle or a skyrocket, is a matter of education; the differentiation between them is psychic, not retinal. Form is the definition of light and shadow, the result of contrast—its detail being dependent upon the intensity of the light projected and not to any power of the retina to discriminate. The film in a camera has no power of discernment or differentiation, yet it received the impression of form, regardless of its shape, just as quickly, just as faithfully, just as accurately as the retina does.

The function of the retina enters into the scope of this paper only in a brief way, but I want to take this opportunity to again reiterate those facts which I have proven mathematically and demonstrated by the "prismatic perimeter," that the at present accepted theories of the various color fields, and that of a contraction of the perceiving elements of the temporal portion of the retina are pure fallacy, and the perpetuation of these errors, by persistent teaching, is a reflection on ophthalmology as a science and an insult to the intelligence of the student. There may be a color center, but there is no color field; all color, or any of its compounds, is recognized at the periphery in all the meridians, equally as well as form.

With this final elimination of false function, we are in a position to consider the eye, independent of influences caused by faulty or partial transmission of energy to its muscles, and find it to be purely a high grade, self-focusing camera, constantly set, helplessly receiving all kinds of impressions, many irrelevant. This constant multiple photography of irrelevant images, to an already exhausted

center, is a factor which has not been brought out by the ophthalmologist or neurologist, and in the closing of this paper, already too long, I will confine myself to the consideration of the psychical tax from irrelevant impressions of the special senses.

By irrelevant impressions I mean impressions which intrude upon the brain centers, and which are ruthlessly continued against the individual's will. These impressions are received through the special senses of sight and hearing. Sound, as ordinarily conveved, is composite. The clack of the horse's hoof, the automobile's exhaust, the whirling trolley, the resonance of the rails, conversation, and the impulse of atmosphere by moving bodies is received en masse, and is ignored. Once sound becomes individualized, it is either sought or repelled. A beautiful song is listened to during several renditions and then palls; a quartette in discord is instantly rejected; a crying child is hushed. In other words, we can, and do, eliminate all irrelevant impressions of sound, but we can not eliminate the irrelevant impressions of sight, which are constant and more menacing, for sight is never composite. That which is before the eye is delineated in detail and is acted upon by the intelligence, before the eye will leave it. Let me illustrate what I mean by irrelevant impressions of sight: A patient, male, middle age, no psychasthenia, a man who is handling million-dollar contracts, said in my office, in a jesting way, "I wish they would take those damned signs out of the street cars." "Why?" I asked, "have you committed them all to memory?" "Well, pretty near," he replied; "the other day, while going out in the car, I was mentally figuring out a deal, when I found I was adding up the 'St. Jacob's Oil.' I took my eyes from the plagued thing only to have them rest upon 'Uneeda Biscuit,' which made me mad." This may seem trivial, but when we consider that from the waking moments in the morning until we retire, this constant multiple photography of hundreds of images which only annoy, being ruthlessly transmitted to an already exhausted center, I think we are entitled to the conclusion, that in psychasthenia they become a factor to be considered; in health, we can take care of them, in psychasthenia, they become a menace.

I am convinced that, at 45 years, we meet with an epoch in life that demands of the physician, at least that consideration given to the epochs of teething and puberty. At this age, when responsibilities are the greatest, from success achieved; when one is unable to extricate himself from the demanding influence of an ever increasing business, when volition and intent remain intact, but dissociated from energy impaired, scientific medicine must attend to the curtailment of the expenditure of energy, instead of becoming engrossed in isolated phenomena as expressed by functionating organs. Where better to begin, than with the eye upon which the movements of the body are materially dependent? Whose heterophorias convey false intelligence to body muscles, through false projection; which is the first organ to receive and consume the primary nerve impulse in its dictation to body muscles, and which is constantly ruthlessly conducting multiple irrelevant impressions to an already exhausted center. We as physicians and ophthalmologists, can no longer negligently consider the eye alone as affected by disease, if it also be a factor in disease.

Ophthalmology teaches that a mydriatic is not necessary in refracting presbyopia; it is of the greatest importance in these cases, since it sometimes reveals sthenic conditions, which the patient carefully conceals from friends, family and physician. Instead of refracting these cases, like an optician, a careful examination for latent heterophorias, errors of refraction and sthenic conditions, under a mydriatic, places us in a position to consult and be of material aid to the physician.

Believing a week of absolute rest in the incipient stage of psychasthenia would benefit the patient more than six months in a sanatorium, after secondary changes have taken place, I have recently substituted for that last resort prescription, "change of scene" for the more logical one of cessation of scene, which is accomplished by keeping the patient under a mydriatic and confined in a specially prepared dark room with every ray of light excluded, the patient being seen daily by the attending physician as well as myself. The favorable results obtained by this method, which, at present, is still in the experimental stage, have been so marked, not alone to the eyes, but also to the sthenic condition generally, that I believe the future holds a closer relationship between the oculist and practitioner in the conduction of these cases.

DISCUSSION.

Dr. Vail:—An essay of this kind is like the cutting of tall timber that has never been entered into and is pioneer work. Like every new teaching, we must become somewhat familiar with all the ideas before we can thoroughly and fully appreciate the subject. We realize that when it is published we can read it over carefully in the quiet of our libraries and can then digest this interesting matter.

A NEW METHOD OF TENDON SHORTENING.

PRESENTATION OF INSTRUMENTS.

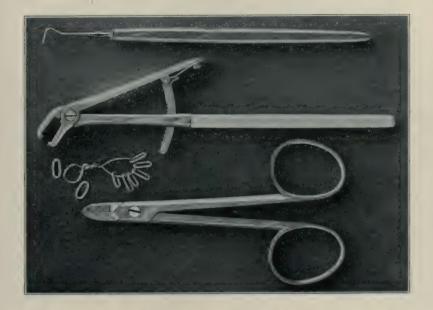
H. H. Briggs, A.M., M.D. ASHEVILLE, N. C.

The method to be described is applicable to any case where shortening of an ocular muscle is indicated. The principle involved is the looping of the tendon and maintaining the shortening thus attained by means of a flattened ring of silver wire clamped over the loop until inflammatory adhesion takes place.

The ring, elliptical in shape, is made of silver wire (No. 22 Brown and Sharpe standard). It is long enough to extend across the tendon and wide enough to allow a small tendon hook with the looped tendon and overlying conjunctiva to pass through its lumen. The major axis of the ring should be about 5 mm., the minor axis about 2 mm. Pure silver wire gives the proper amount of resiliency, retains its compressed shape, is easily removed and seems to serve better than an alloy.

The other instruments are the clamp-forceps for compressing the silver ring over the tendon-loop and the special tendon hook for pulling the tendon up through the ring. The forceps has a straight handle and a thumb-lever, somewhat like the Knapp kneedle forceps. The jaws are at an angle to the shaft, being bent in a plane with the handle and thumb-lever. Passing entirely across the approximating surface of the jaws near the tips are transverse grooves deep enough to hold the long parallel sides of the silver ring, while the length of jaw to the angle is sufficient to accommodate the longest loop of tendon that may be desired. The hook is like those ordinarily used in tendon operations, except at a point 5 mm. from the elbow the shank is bent backward in plane of the hook at an angle of 15 degrees. This bend allows the handle of the hook to be held out of the operator's line of vision, while the hook remains parallel to a tangent plane of the eye at the site of operation. The hook should be short enough to pass through the major axis of the ring, and yet sufficiently large and strong to pull the tendon through the ring, overcoming the pull of its opponent muscle which may or may not have been previously tenotomized.

After the usual preparation of sterilization and anesthetization a small opening is made in the conjunctiva on one side of the tendon 2 to 4 mm. from its insertion, the distance from the insertion varying with the degree of shortening intended. An ordinary tendon hook is then passed beneath the tendon and held by an assistant. The clamp-forceps, holding the silver ring, is held over the tendon with one hand, and the special tendon hook passed down through the ring and substituted for the hook held by the assistant. The tendon, with its overlying conjunctiva, is drawn up through the ring to the desired degree and the jaws of the clamp forceps



forcibly approximated. If the degree of deviation is great and the tendon loop to be made long, the conjunctiva after being drawn up through the ring a short distance may be incised, allowing the tendon only to be advanced to any desired degree. It is also well in these excessive advancements to excise the greater part of tendon and tissues protruding through the ring, leaving only enough to insure non-retraction of the tendon ends through the ring.

The moderate edema of the tissues about the ring immediately covers it so that no irritation is felt from the presence of the foreign body. Within twenty-four hours the strangulated tissues within the ring become white and begin to atrophy, and on removal of the ring, in ten to fourteen days, should be excised.

For removal of the ring a seissors-cutting forceps with wedgeshaped blade above, and flat blade below, is used to divide each end, when the separate halves may be removed with small tissue forceps. The advantage of this operation over the usual methods of advancement are:

- 1. Absolute security from slipping or retraction of tendon.
- 2. Simplicity.
- 3. Elimination of sutures.
- 4. Short duration of time of operation.
- 5. Less pain.
- 6. Less amount of plastic inflammation during convalescence.
- 7. Less scar and deformity.
- 8. Better results.

DISCUSSION.

Dr. RAY:—I would like to know how much effect Dr. Briggs gets from this operation, or if he knows how much tendon to pull into the ring, otherwise, if he can gauge the effect?

Dr. Jackson:—I would like to know whether Dr. Briggs has any difficulty in guaging the proper amount of pressure to put on the tendon, so that the ring will hold and not cut the tissue; or whether it will stand the greatest pressure he can put on it without danger of cutting through and having evil consequences. It strikes me the operation is important from its simplicity.

Dr. Briggs (closing):—You can get any effect you wish by pulling the tendon as far as you like through the ring. The distance actually advanced would be represented by twice the length of the loop pulled through. As to the amount of pressure, I have operated on twenty-three cases and have never yet used enough pressure to cut the tendon; nor has there been such a small amount of pressure as to allow the tendon to retract. In a few instances I had made a few little points on the inner side of the ring by driving a sharp instrument into the side, fearing it might not hold, but I do not use that any more. The ordinary pressure you would use on a needle forceps with the leverage of the instrument seems to suffice. I think with the ordinary pressure it would be hardly possible to cut the tendon in two.

INCREASED TENSION IN OCULAR DISEASES OF INFANCY AND CHILDHOOD.

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That there may be a disturbance of the relations between intraocular pressure and the resistance of the supporting tissues of the eve, in the young as well as adults, is a well-established fact. But a deviation from the normal relationship of these two factors is ordinarily much more easily recognized in the adult than in patients in infancy, or even in childhood. In the adult, also owing to the more stable, mature character of the ocular coat, rendering it less elastic and less liable to undergo distension, this disturbed relationship more noticeably manifests itself in tension plus or tension minus, according to the nature of the deviation. On the other hand, in childhood, besides the greater difficulty in eliciting the tension, the problem is made more difficult by the fact that an increased intraocular pressure may actually exist, but may not be manifested by the usual Tn +, owing to the elasticity of the coats of the infantile or juvenile eve, and perhaps their gradual stretching and the consequent distention of the bulb in part or all of its diameters. Just as increased tension in the adult-glaucomaproves disastrous to the integrity of vision, so similar disturbance in the young may eventuate in this same manner. These cases are not common and in less marked manifestations are not easily or quickly recognized.

Their rarity should, however, be no excuse for failure to be on the alert for cases presenting such symptoms, as by early recognition we can no doubt be more successful in dealing with them.

Inflammatory glaucoma is a disease largely of adult life, yet the clientele of every ophthalmic surgeon has probably furnished a number of cases in which typical glaucoma occurred in patients between 10 and 20 years of age. In several such cases which I have seen no other disease than glaucoma could be diagnosticated, and fortunately most yielded to treatment without surgery.

My interest in this subject has been stimulated by cases, however, not so typical in their adherence to the usual glaucomatous symptoms, and I shall briefly report some of these:

CASE 1.—Baby D., aged 15 months, was brought to me by her parents, at the suggestion of the family physician, on account of continued trouble with her eyes which had been present for eight or nine months. The child had been under treatment most of this time. Nothing unusual had been noticed in the eyes or vision until the child was 6 or 7 months of age, when mild congestion, tearing and photophobia developed. These symptoms seem to the parents to have increased in severity on the whole, though there were intervals in which they abated. The child seemed well nourished. Photophobia and blepharospasm were marked. On forcible exposure of the eyes the corneal surface showed a slight milkiness or opalescence, though the epithelium was intact. The deeper corneal layer appeared to be clear. The anterior chamber was deep, the pupil slightly dilated and sluggish in response to light. There was mild circumcorneal injection and profuse lachrymation on exposure of the cornea to light. As could be best estimated tension was + 1. Subsequent examinations confirmed the opinion that not only was the anterior chamber abnormally deep, but there was increase in the diameter of the cornea and of the entire bulb.

The treatment adopted was the use of 2 per cent. dionin and eserin, and weak atropin side by side. Forcible stretching of the orbicularis to overcome photophobia and blepharospasm. Sniffling and nasal obstruction were present, and without general anesthesia the postnasal space was cleared of a fair amount of adenoid tissue, an appropriate nasal treatment given in addition to the care for the eyes. Improvement was noticeable in less than two weeks, and in two months office treatment was discontinued. The photophobic and inflammatory symptoms subsided together. The haziness of corneal surface diminished and a number of months later was very slight. Whether the use of a mild vellow oxid ointment had anvthing to do with this I do not venture to say. There still remained, however, the impression of slight keratoglobus if not of hydrophthalmus. The child now, at the age of four years, impresses the parents as having very good eyes and vision, though being "slightly near-sighted."

Case 2.—Baby R., 4 years of age, was brought to me on account of continued inflammatory trouble with his eyes. The disease began when about 1 year of age, and the symptoms enumerated were practically identical with those given in Case 1. The photophobia was more severe and a careful examination of the eye was not so possible as in Case 1. There were to be noticed slight maculæ corneæ, deep anterior chamber and a slightly dilated and sluggish pupil. The parents stated that the child had of late played very little with its toys, and then only in subdued light, and "seemed to be very near sighted."

The child presented the symptoms of marked lymphoid (tonsil-adenoid) disease and the anesthesia required for operation was made the occasion of a careful examination of the eyes. Not only was the anterior chamber deep, but moderate hydrophthalmus was in positive evidence, much more advanced in one eye. Tension was plus.

Treatment similar to that in Case 1 was instituted and followed for several weeks, with diminution in the photophobia and blepharospasm, but no apparent improvement in vision. As little encouragement had been given the parents to anticipate restoration of sight from treatment, the case disappeared from view.

Case 3.—Josephine K., aged 14, was one of a family of four children, two boys older, and one sister younger. Neither the parents nor brothers had ever suffered from any eye trouble. Up to the age when she entered the public schools no trouble had been experienced with her eves. Later increasing difficulty in vision was noticed and the trouble was ascribed to "near-sightedness," and glasses were put in. The trouble increased and she was put under the care of an ophthalmic surgeon in another city and glaucoma diagnosed. On examination both eves were found to be moderately hydrophthalmic with Tn + 2. Staphylomata were showing in the ciliary region. There was a central opacity of both corneæ; irides slightly atrophied and tremulous, lenses starchy. Vision was light perception, O. U. Four months after my first examination of this case I was called to see her and enucleated the left eve, which had been ruptured by a fall from stumbling in a hallway. The remaining eye is becoming so distended that enucleation will probably be required later.

Case 4.—Anna K., younger sister of Case 3, aged 11 years, was examined Nov. 5, 1902. The same history was given of increasing failure of vision, beginning after school age, until it was feared that longer continuance would result in the same condition her sister had reached, the disease having been diagnosed as the

Examination showed: Right eye, globe normal in size, no signs of inflammation; the crystalline lens was dislocated superotemporally and pushed the iris forward toward the cornea. The iris was tremulous save where in contact with the lens. Tension was diminished. Vision equals fingers at four feet (10/200).

Left eye, globe of normal size, no signs of inflammation; iris pushed forward by lens (transparent) so that pupil is at small end of a rather flat cone; tension normal; refraction myopic. Reads ordinary type with ease.

Dec. 10, 1902 I was called to see this patient and found her suffering from an attack of acute inflammatory glaucoma of the right eye. Tn + 2, anterior chamber apparently abolished and lens completely cataractous. In twenty-four hours, there having been yielding to treatment. I made a paracentesis. This relieved the glaucomatous symptom, though the anterior chamber was not

completely restored. Two weeks later the cataractous lens was removed by linear extraction. There was some entanglement of iris in the corneal wound, due to the difficulty of working in the shallow anterior chamber. Since then the right eye has remained quiet with vision equal to 20/70 with correcting lens.

July 9, 1907, the patient came to see me concerning her left eye. I found it injected, tension + 1, and the dislocated transparent lens lying in the lower angle of the anterior chamber, which was not nearly so shallow as when patient was first seen. The patient was put in the hospital and cold compresses and eserin ordered. I expected as soon as she was prepared for an anesthetic to attempt the extraction of the lens. On inspection at the hospital it was found that the lens had slipped back into the posterior cham-



Right Eye. Ectopia Lentis. Acute Inflammatory Glaucoma at 11 Years of Age. Paracentesis and, later, Lens Extraction for Cataract. No Distension of Globe.

ber; the eye was free from pain and showed less congestion. Irritative and tension symptoms lessened, and as I was leaving the city for my vacation, the patient was allowed to go home and asked to report if signs of irritation returned. Oct. 5, 1907, she returned. There were no signs of active inflammation and the tension was normal, but the lens had become cataractous, and marked stretching had taken place in the sclera of the ciliary region and of the limbus. The anterior chamber was deep, and the appearance of the ocular bulb suggested beginning hydrophthalmus. Under general anesthesia I extracted the lens, and performed a broad iridectomy, executing these in the order named. My reason

for this was that I wanted as quietly as possible to get the lens out, for this was considered the main desideratum of the operation, and it was feared some complication, as loss of vitreous, might occur during its performance. The lens was removed as early as in any case of juvenile soft cataract. Iridectomy completed the operation. Four weeks later with + 5.00 D. S. the vision of the eye was 20/100. The photographs from untouched negatives herewith show perhaps imperfectly, but very satisfactorily, the different effects of the high tension on the two globes. In the right the scleral portion of normal size, the cornea slightly flattened if changed at all, and the anterior chamber shallow. In the left the scleral portion of bulb is slightly distended, especially in the ciliary



Left Eye. At Age of 14 Years. Subacute Glaucoma, with Luxation of Lens, Cataract and beginning Hydrophthalmus. Extraction of Lens and Iridectomy.

region, very slight keratoglobus, and a deep anterior chamber. The conditions in the right eye being due to a sudden, acute disturbed ocular pressure, those in the left to a subacute disturbance continued through a longer period of time.

These cases cited serve to call attention to tension—or rather the relationship of intraocular pressure to the resistance of the ocular coats. Increased pressure may result in damage to the nerve without much effect on the ocular coats, as in glaucoma of the adult; may effect considerable change in these coats, the function of the nerve suffering very little (one of the most marked cases of this kind being reported in Warlemont, in which the corneal di-

ameter was increased to 17 mm., the eyeball enlarged in all directions, iris tremulous, and pupil eccentric, vision remaining 20/30); or again, as is most commonly the case where the disturbance is not arrested early in its course, both coats giving way under the pressure and the nerve damaged until vision is reduced to p. l. or even total blindness. After a certain stage is reached the bulb may continue to enlarge even when tension becomes minus. The finality of a well-developed case of hydrophthalmus is usually enucleation, inflammation of the cornea from exposure giving rise to this necessity. I have not seen pain of a glaucomatous nature in any of these cases where the bulb had become distended.

In going through the records of admission to the Ohio State School for the Blind for the past ten years, covering something over 500 pupils, there are 15 in which it was recorded that one, or both eyes, were hydrophthalmic. Data gained from history and examination indicates pretty clearly that ophthalmia neonatorum, with some corneal lesion, was the initial factor in at least six of these cases. In four ulcerative keratitis had been present and the evidence pointed to a severe inflammatory disease of the anterior segment of the eve as having preceded other changes. In the others there was less evidence to support a contention of other initial ocular disease. While cases of partial or complete blindness from the corneal lesions of trachoma and purulent ophthalmia are among these records, in which the various forms of staphyloma were present, in none of them was it found that the eye had become hydrophthalmic. Of six admissions from glaucoma in its ordinary phase, in only two was the patient under twenty when the disease developed, one 17 years of age, the other exact age unknown.

In the more moderate condition of hydrophthalmus tension in the above case was found plus, seldom over +1, in one case being recorded as +2 in one eye, where in the fellow eye it was -2. Despite minus tension these hydrophthalmic eyes continue to enlarge, the diminished tension usually indicated an increasing thinning of the cornea and sclera, together with exposure keratitis, conditions which seem incompatible with plus tension.

Johnson reported to the American Ophthalmological Society in 1898 three cases of buphthalmia occurring in one family, the disease showing at an earlier age than the developments in Cases 3 and 4 of my report. Priestley Smith reports an instance of hereditary glaucoma (*Ophthalmic Review*, xiii, page 215), both eyes of father and daughter having been affected, and gives the opinion that hereditary smallness of the eyeball, containing dis-

proportionately large lenses, predispose to glaucoma, and that such eyes are ordinarily attacked earlier in life by the disease than eyes of normal size.

Snellen, in writing on the treatment of infantile glaucoma leading to buphthalmia, says there are two forms of glaucoma. Glaucoma anterior occurs with iritis, keratitis diffusa, descemetitis and very typically with hydrophthalmus. There must be congenital anomalies of the eye as intimated by Priestley Smith's theory as to hereditary glaucoma, changes at the filtration angles, congenital weakness of the ocular coats or some abnormality in their function in assisting filtration of the intraocular fluids—to explain those cases where hydrophthalmus appears without manifest antecedent inflammation.

Knies' experiments, reported in Volume 24, Archives of Ophthalmology on "The Anterior Outflow Channels of the Eye," demonstrate an exit for fluids not only at the angle of the iris—Spaces of Fontana—but also by the posterior surface of the cornea—through the membrane of Descemet and corneal stroma, and thence to the subconjunctival tissues. Bowman in discussing the subject of conical cornea, which disease has its kinship to glaucoma and hydrophthalmus, calls attention to the fact that progress in this disease is checked by transudation of intraocular fluid by this route so that the balance between resistance of the cornea and intraocular pressure is re-established.

This array of facts should help us keep in mind that disturbance of intraocular pressure may be an element in a number of diseases of the eye in infancy and childhood, and may explain a less tractable course for some of these maladies. It may disappear as an element in the disease without having wrought any permanent impairment to vision, but in others may do damage to this function, and yet in others give rise to secondary changes that will in time produce blindness. In such ocular inflammations the usual local treament may have to be influenced by this element of increased tension, eserin and dionin being agents that, judiciously used, will greatly aid in resolution of the disease. The element of high tension may cause us to use cold as an application, where otherwise we would prescribe heat.

In incipient, but positive, beginning hydrophthalmus, iridectomy should prove useful. Snellen says iridectomy is unusually dangerous in these cases, this opinion applying no doubt with more force to advanced cases, and advises repeated sclerotomies with myotics. On the other hand, reports are on record of cases ar-

rested by iridectomy: One by Bergmeister in a child of six months of age (Wiener Klin. Wochenschrift, No. 18); and Lodato, studying the subject, declares iridectomy the best means of preventing further development of the hydrophthalmus.

It is doubtful whether it is of any advantage when the disease is advanced, *i. e.*, the eye greatly enlarged, vision reduced to nearly light perception and tension has dropped to normal or is minus.

INNOVATIONS IN THE OPERATIVE TREATMENT OF PERSISTENT GLAUCOMA: A STUDY OF THE SUBSTITUTES FOR IRIDECTOMY.

A STUDY OF CYCLODIALYSIS (HEINE), SCLEROTOMY (LAGRANGE)
AND OTHER INNOVATIONS.

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The management of the various forms of pathologically increased intraocular tension is one of the vital questions of modern ophthalmology, and in spite of the vast amount of pathological research, clinical observation, and operative advance, it still remains an open one. We note first the existence of certain forms, hemorrhagic glaucoma and simple chronic glaucoma, as to which there is a general consensus of opinion as to serious course, grave prognosis, both as to vision and the integrity of the eye, their intractability to treatment in general, and the frequent bad results of the iridectomy. This characteristic reaction or lack of reaction to the surgical procedures which are so efficacious in ordinary glaucoma has resulted in a clinical and diagnostic differentiation.

There seems to be marked analogy to forms of optic nerve atrophy with progressive slow course and, generally painless, hypertension, indicated by a gradual contraction of the field, especially the nasal half, steady loss of vision, the development of a deep atrophic excavation, and entire freedom from pain, ocular injection and other signs of inflammatory reaction. The differentiation of non-inflammatory simple glaucoma from that associated with irritation and inflammation is not always clear from the clinical standpoint. Inflammatory symptoms may develop in "simple" cases of many years' standing without ascertainable cause (Hirschberg and Ginsberg, Centralbl. für Prakt. Augenh., xxxi, p. 1).

Another group is represented by those cases of inflammatory glaucoma which are not at all, or only temporarily, relieved by iridectomy, or, again, show a marked tendency to relapse in spite of operation.

The subject of treatment is a wide one, and of late years the debate on the comparative value of medicinal, myotic treatment and of surgical intervention has been taken up with renewed activity. A decision has not yet been reached, and the consideration

of this aspect of the question lies outside the limits of our presentation, which has as its main object a comparative study of the various surgical procedures which have in the course of time been introduced to assist or to take the place of the classical glaucoma iridectomy of v. Graefe.

While iridectomy is still considered the sovereign remedy for the large majority of all cases of glaucoma, is indispensable in acute forms, valuable in chronic forms, and even in glaucoma simplex is at least as favorable as any other procedure, in the judgment of many experienced observers, a number of operations have been suggested in the last decade or two, having as their object either to render the effects of iridectomy more permanent, to facilitate the technical success of the operation, or to replace it entirely.

We may accordingly distinguish two forms: Iridectomy substitutes and modified operations. A third series of procedures was designed to be applied after iridectomy had failed, and persistence of pain and high tension, with or without inflammatory reaction, in a sightless or rapidly failing eye, required relief at any cost.

Among these procedures we may cite posterior sclerotomy, opticociliary neurectomy, and extirpation of the ciliary ganglion. Extirpation of ciliary ganglion (Rohmer, Abadie, Terrien) requires osteoplastic resection of the orbital wall after Kroenlein, and is a rather blind procedure, as it is not always possible to find the ganglion or to be sure that it is contained in the tissue removed from the depth of the orbit. It is permissible, at best, only in case of absolute glaucoma with persistent pain, where for some reason enucleation is inadvisable or has been refused by the patient. The only advantage over optico-ciliary neurectomy is the preservation of the globe, as atrophy does not follow, and the remnant of integrity of the optic nerve is preserved. Pain is relieved at once, but tension is not always reduced to normal. Trephining the sclera, and, as a last resort, enucleation. As these operations are intended more for the relief of intractable symptoms than for the actual cure of the glaucomatous process, and as our subject is rather a consideration of the supposedly or actually curative and effective substitutes and modifications of the classic operation for glaucoma, we may pass over them to a consideration of the latter class.

Modifications of Iridectomy.—These were suggested by the dangers of the operation under certain conditions of extreme tension, shallow chamber, wide pupil, or hemorrhagic tendency, either general or intra-ocular. The most valuable is the preliminary sclerotomy, first recommended and employed as a routine by Priestley

Smith, and taken up again of late by A. Knapp and others. Among other procedures are peripheral iridectomy or button-hole operation, iridedialysis, and others since abandoned.

Substitutes for Iridectomy.—In this class we may distinguish between minor or temporary procedures intended to reduce tension due to a transient cause or at least not due to primary glaucoma. Thus, in the high tension due to swelling of the lens in a stage of imbibition in senile or more frequently in traumatic cataract due to rupture of the capsule, in some forms of iritis, where the mutilating effect of iridectomy was to be avoided if possible, and the possibility of treatment with atropin continued, the object being to let out a certain amount of aqueous humor through an incision which should be so small as to preclude danger of iris Anterior sclerotomy or paracentesis of the anterior chamber by section at the limbus was recommended, and this form of operation was even extended to glaucomatous hypertension by a modification intended to open up the tissues at the filtration angle (incision of the iris angle). These and similar suggestions have been followed for some time and are not strictly innovations in operative treatment.

The more modern substitutes with which we are directly concerned owe their origin to two theories of the curative mechanism in iridectomy and other operations for glaucoma. Of these, the most important and well based hypothesis considers the opening up of a large area of iris tissue for filtration, and the freeing of an occluded iris angle, as the main factors. It was believed that other portions of the uveal tract could be made available for this purpose and filtration paths established into the supra-chorioidal space without sacrificing or injuring the iris, a manifest advantage in many cases, but most important in vascular disease or hemorrhagic tendency where copious bleeding would be apt to diminish or nullify the good effects of iridectomy.

Value of Sclerotomy.—It is the operation of choice, according to Czermak, in simple glaucoma with good central and peripheral vision, and slight increase of tension, if any, where iridectomy would be contraindicated on account of the optical disturbance it causes; in chronic glaucoma with plus tension and without attacks of pain, with rapidly diminishing visual field, which run a notoriously rapid unfavorable course after iridectomy, and in cases of atrophy of the iris, where the latter operation can not be performed, lege artis; in recurrence of glaucoma after iridectomy, or its development in consequence of dislocation of the lens or of serous

iridocyclitis with deep anterior chamber, and, finally, and undoubtedly, in glaucoma with irideremia.

Modifications of the Sclerotomy Operation.-Incision of the Iris Angle. De Wecker. Scleral flap section with a narrow Graefe knife, about 1 mm. from the limbus, as if to produce a scleral flap 2 mm. high. The section is to be made very slowly, and not completed, that is to say, after counterpuncture the sclera is not cut through but a central bridge about 3 to 4 mm. wide is allowed to remain. As the knife is withdrawn the handle is depressed (in section upward) so as to cut through the tissues at the filtration angle with the retreating point, leaving the layers of the sclera partially divided throughout the extent of the bridge. In case of a shallow anterior chamber the knife may have to describe a slight curve to avoid the iris. If the chamber is deep, the incision may be made a little lower down. Eserin should be instilled before and after operation, as it facilitates the procedure and assists in keeping open the wound made at the filtration angle. The bridge of scleral tissue was intended to prevent iris prolapse and to allow a more gradual escape of aqueous. If there is irregularity of the pupil, showing that the iris is adherent to the posterior lip of the wound or folded on its base, the iris-repositor or spatula must be introduced. If this is not effectual iridectomy should be performed. This is to be advised unhesitatingly in case of actual prolapse of the iris, either during operation or at a later stage.

Wound Healing.—The entire section should be about 8 mm. long. A filtration scar is a frequent sequela of this operation; in fact, De Wecker considered it the rule and ascribed the good results of the procedure to this fact. There are undoubtedly, however, cases with normal healing in which the operation was perfectly successful and efficacious (Czermak).

Operative Procedures Based on Intra-Ocular Filtration.—In these procedures the attempt was made with the underlying idea being to open up communication between the anterior chamber and some part of the uveal drainage tract, either filtration angle, ligamentum pectinatum, root of iris, or supra-chorioidal space. The principal exponents of this idea were Nicati, De Wecker, Tersoni, Knies, Panas and De Vincentiis, and the best known operations are incision of the iris angle, iridodialysis or arrachement de l'iris, sclero-choriotomy and cyclodialysis.

Operative Irido-Dialysis.—Sclero-Iritomy.—Nicati (1892) applied this name to a procedure which he devised for the purpose of detaching the iris from its "attachment" to the sclera by means

of a keratome incision through the latter membrane. The section was made with a lance knife having a shoulder or stop, and this was carried, under a conjunctival fold, tangentially to the cornea and perpendicularly to the plane of the iris. This procedure was originally recommended for glaucoma secondary to incarceration of the iris, and primary senile glaucoma, but later on Nicati admitted that it gave but indifferent results in ordinary glaucoma.

Irido-Sclerotomy. Knies.—In this operation the sclero-corneal incision passes through the root of the iris, detaching it and causing an operative irido-dialysis, but the iris is not cut out. The section is best made upward with a Graefe knife. The section must be well back of the limbus and be completed very deliberately.

Irido-Sclerotomy. Panas.—This operation was intended for cases with a very shallow anterior chamber, the knife being intentionally carried directly through the tissue of the iris, both at puncture and counter-puncture, thus actually performing iridotomy. In completing the section the blade of the knife is turned forward and the bridge of iris tissue completely severed. As in De Wecker's selerotomy, the section is not carried through the entire thickness of the sclera, but a bridge remains, and two scleral wounds are produced which are each 2 to 3 mm. long. The section is made with a Graefe knife at a point about half way between the horizontal meridian of the cornea and tangent to the lowest or highest point of its periphery. As soon as the point of the knife appears in the anterior chamber it is plunged through the iris, carried about 8 or 10 mm. further on, pierces the iris again, appearing in the anterior chamber and then emerging at the counter-puncture.*

Indications.—In high tension with shallow anterior chamber, due to accumulation of fluid behind the iris, as in pupillary seclusion, annular anterior synechiæ, large staphyloma and as a preliminary to iridectomy.

Nicati (1894) devised a new operation, similar to that of Knies and Panas. A narrow Graefe knife is carried, cutting edge downward, through the sclera at the lower limbus, as in De Wecker's sclerotomy. After counter-puncture, the edge of the knife is turned directly backward until the blade is at right angles with the plane of the iris. The latter is then severed at its attachment throughout the entire extent of the section.

In this operation the iris is severed by backward section from the anterior chamber, the knife cutting through its tissues but

^{*}Knies claims that this operation of Panas' is identical with his irido-sclerotomy, an operation which has actually been performed unintentionally by many operators who thought they were making an iridectomy.

once, whereas in the Knies-Panas procedure the same thing is accomplished in cutting out from the posterior chamber after the iris has already been pierced in making the puncture and counterpuncture. Treacher Collins has shown that this double perforation of the iris actually takes place in almost all sclerotomies with a peripheral section and adhesion of the ciliary margin of the iris to the cornea, so that the sclerotomy is actually an irido-sclerotomy. De Wecker and others have raised the very valid objection to the Panas-Knies procedure, that there is great danger of injuring the lens, as the posterior chamber is not deepened in glaucoma, and the lens lies close to the posterior surface of the iris.

Combined Sclerotomy.—De Wecker (1894). Section 6 mm. long placed 1 mm. back of the limbus with a stop keratome. A fine pair of iris forceps is introduced into the anterior chamber after the aqueous has been allowed to drain off slowly to avoid iris prolapse. The periphery of the iris is grasped and pushed along the posterior surface of the cornea toward the center of the pupil until the adherent ciliary margin has been detached for a distance of 6 to 8 mm. This is generally indicated by copious hemorrhage which may entirely fill the anterior chamber. Contrary to the usual custom the iris forceps must, of course, be open when it is withdrawn from the anterior chamber. If this point is forgotten, the iris may be dragged out of the wound. This accident is best prevented by allowing the forceps to remain open in the wound for a moment after completing the detachment. This has the advantage of allowing some of the blood to escape from the anterior chamber, and at the same time holds back the detached iris.

Incision of the Iris Angle.—(Inscisione dell angolo irideo) according to De Vincentiis (1894) is performed with a small sickle-shaped knife-needle, which is sharpened on its convex edge. The shaft of the instrument is cylindrical or elliptical and tapers toward the blade so as to prevent escape of aqueous during the section. Puncture is made 1.5 mm. from the limbus and a like distance from the horizontal meridian of the cornea, and the knife thrust obliquely through the sclera into the anterior chamber. It is then carried through the anterior chamber parallel to the surface of the iris until, at a point directly opposite the puncture, it engages the angle of the anterior chamber and passes into the tissues there to a depth of 1 mm. The iris angle is now incised as the sickle is withdrawn, the cutting edge being turned toward the sclera, and the knife kept in contact with the angle of the

anterior chamber until within a millimeter or two of the original puncture.

Tailor, De Vincentiis' assistant, recommended this procedure for all stages of inflammatory glaucoma, as well as for the hemorrhagic and simple forms, and for secondary glaucoma due to serous iritis or cyclitis or to anterior sclero-chorioiditis. Czermak expresses grave doubt as to the feasibility of an exact operation except in case the filtration angle is free, i. e., where the plus tension is not due to occlusion of the iris angle, but to obstructions in the ligamentum pectinatum or similar cause. In any event the technic meets with almost insuperable obstacles and the usual result would be a probably extensive operative iridodialysis.

The object of the operation is actually to open up Schlemm's canal, and the following advantages over other glaucoma operations were claimed for it by Tailor:

- 1. It is applicable, as opposed to iridectomy, even in cases of firmly adherent or atrophic iris, whereas in such cases the iris tears off medially from the point of attachment in attempt to perform iridectomy, and thus nullifies the effect of the procedure.
- · 2. It can be performed in a very shallow chamber (Czermak doubts this), and opens Schlemm's canal for a long stretch, which is probably of value in case of atrophic changes in the filtration angle.
- 3. Tension is diminished gradually, as the anterior chamber is not emptied by the section.
- 4. The operation can be repeated as often as required, and causes a slight and not at all dangerous wound.

Of these modifications Czermak exclaims: "What by-paths to get around an iridectomy and yet to reach the same goal!"

Querlenghi (1902) devised a procedure which he terms sclero-choriotomy. A Graefe knife was introduced into the sclera some distance back of the limbus with the cutting edge upward, i. e., the back toward the interior of the globe and the point directed toward the middle of the anterior chamber. When the point appeared in the anterior chamber the handle of the knife was depressed toward the globe and the instrument withdrawn, cutting through the root of the iris and the chorioid down to the sclera and opening up a path for the intra-ocular fluids from the anterior chamber to the supra-chorioidal space. This operation does not seem to have met with favor, to judge by the fact that scant reference to it is to be found in the literature. The evident objection is the danger of hemorrhage, of injury to the lens, and further the

fact that there was no guarantee of a wide and lasting channel for filtration.

A somewhat similar procedure, however, met with immediate approval, and, as it is one of the few which is based on a careful study of filtration processes, a somewhat more detailed consideration may be in place. This operation was suggested by Heine in 1906, and termed by him cyclodialysis. As the name implies, it consists in instrumental detachment of the ciliary body and intact iris from the sclera with penetration of the tissues at the filtration angle, and is intended to open up a channel from the anterior chamber to the supra-chorioidal space. The scleral incision was not to play a part in filtration, the latter was to take place by the usual channels, *i. e.*, the vessels and lymph spaces between sclera and uveal tract by means of the artificially established communication.

Cyclodialysis (after Meller-Pyle, Ophthalmic Surgery, 1908). This operation by Heine was inspired by the articles of Fuchs and Axenfeld, who described the chorioidal detachment following iridectomy for glaucoma and preliminary to cataract extraction. pointed out the accompanying diminution in intra-ocular tension, and concluded that the chorioidal detachment was due to oozing of aqueous backward through tears in the ligamentum pectinatum caused by the operation. Heine's idea was to establish an artificial opening in the ligament, allowing communication between the anterior chamber and the suprachorioidal space, producing a detachment of the chorioid which would reduce tension. It was taken for granted that the tear would not heal again spontaneously, and that the supra-chorioidal space was a natural filtration channel for intra-ocular fluids or could be converted into one by operation. Neither of these assumptions was verified in practice. The expected detachment failed to appear even in those cases in which tension was markedly reduced. Lowered tension, which in successful cases may last for months, is independent of a supposed detachment of the chorioid. The latter disappears in a few days. or at most in a couple of weeks, if extensive, and tension again rises. The successful results are more reasonably to be ascribed to the undermining of the angle of the anterior chamber and the opening up of the spaces of the ligamentum pectinatum, in short, to freeing the filtration angle or rather establishing a direct communication between it and the anterior chamber on the one hand, and the suprachorioidal space on the other.

Technic.—Incision of bulbar conjunctiva in lower temporal quadrant about 5 mm. from the limbus. Sclera exposed by undermining and retraction of conjunctival flaps. A cut 2 mm. long is made by dissection through the sclera, the tissue being divided laver by laver, the wound kept at the same depth throughout, and the cutting carried on very cautiously. The object is to divide the sclera without injuring the ciliary body, which appears as a blue black mass in the depths of the scleral incision. If a keratome is used, the cutting lateral edge, not the point, is to be used, but a fine Graefe knife is at least a suitable instrument. If correctly performed there should be no hemorrhage from the uveal tract, and no prolapse of vitreous into the scleral wound. A narrow spatula, or iris repositor, is now introduced, and carried forward between the sclera and the ciliary body with its plane parallel to both. The blunt point should have a tendency to hug the inner surface of the sclera in order not to get behind the iris. If all the fibers of the sclera have been divided there is no resistance to the introduction of the spatula, which, as soon as its point appears in the anterior chamber, is pushed forward with lateral motions to and fro, and the ciliary body detached. This detachment is sometimes indicated by the appearance of a black crescent in the iris angle as in iridodialysis. The aqueous does not escape, unless the wound be made to gape by twisting the spatula in situ. If the ciliary body has not been injured during the scleral dissection there will be no hemorrhage into the anterior chamber.

At the beginning of the operation care must be taken to avoid injuring the anterior scleral veins, which in glaucoma are usually much engorged. This accident obscures the field, delaying operation, and the blood may be sucked into the anterior chamber when the spatula is introduced. Adrenalin generally suffices to check bleeding from the small scleral vessels, but the actual cautery may have to be applied in severe hemorrhage from a ciliary vein. If the scleral cut is carried too deep the uvea may be cut through, and vitreous prolapse into the section. The entrance of the spatula into the anterior chamber takes place through the ligamentum pectinatum, which is divided, the filtration angle opened and the ciliary body, with the iris springing from it, detached from the sclera. Iridodialysis and injury to Schlemm's canal are not to be feared, as the iris arises from the anterior surface of the ciliary body, and the canal is protected by a projecting layer of sclera. After withdrawing the spatula the ciliary body resumes its original position, and the angle of the anterior chamber appears unchanged.

Hemorrhage into the chamber requires the application of a pressure bandage, which causes it to absorb and prevents recurrence.

Complications.—Detachment of Descemet's membrane is a not infrequent accident. If the spatula is not sharp enough to penetrate the fibers of the ligamentum pectinatum it glides in front of them on the anterior surface of Descemet's membrane, and is caught in the parenchyma of the cornea. The faulty position is recognized by marked resistance, and the spatula should be immediately drawn back to prevent detachment. The spatula usually takes the right course, even in case the root of the iris is attached to the posterior surface of the cornea (peripheral anterior synechia). After withdrawing the spatula the conjunctiva is closed by a suture, and the eye bandaged.

Character and Effects of Operation.—Iridodialysis is less radical and injures and endangers the eye less than iridectomy. Meller purposely avoided escape of aqueous during operation to test the value of the procedure, with the factor of puncture omitted. Immediately after the operation the eye was, of course, as hard as it was before. As a routine, myotics should be employed after the operation, as they aid in pulling the freed root of the iris away from the angle of the anterior chamber. Aqueous may be allowed to escape by turning the spatula in the wound as described above, in case it is advisable to reduce tension immediately.

Results—The real effect of the operation is not seen until several days later, as it develops gradually. In about 30 per cent. of the cases the tension gradually sinks to normal, or even below normal, in this time; the hazy cornea clears, the anterior chamber deepens—although it is still shallower than normal—and the pupil is less dilated. This improved condition may be permanent. In 40 per cent. the diminution of tension is temporary, and is followed by recurrence of glaucomatous symptoms in a few weeks. In about 30 per cent., notably in absolute glaucoma, the operation is of no use at all.

Indications.—(1) In primary glaucoma, in which iridectomy is difficult or dangerous, either on account of excessive tension or intra-ocular complication, as in abscess of anterior chamber, atrophic or adherent iris, maximal dilatation of the pupil, hemorrhagic glaucoma; (2) where the other eye has been lost after iridectomy, as in severe hemorrhage or malignant glaucoma; (3) in old, very infirm, restless, demented, or coughing patients, as cyclodialysis does not require them to be confined to bed; (4) as a substitute for sclerotomy, preliminary to iridectomy, in excessive

hypertension, to facilitate this procedure by reducing pressure, if only temporarily; (5) in secondary glaucoma, especially that due (a) to ciliary traction, as by anterior synechiæ, which persists in spite of iridectomy, or (b) to dislocation of the lens into the vitreous (its advantage in such cases lies in the absence of danger of losing vitreous, and correspondingly greater security of result); (6) in postoperative (cataract) glaucoma, where the pillars of the coloboma are in correct position. If adherent they should be freed by iridectomy.

Meller concludes that cyclodialysis, while it will diminish tension in a certain number of cases, can not be considered preferable or even equal to iridectomy. It should not be used indiscriminately, but rather held in reserve as a valuable aid or substitute in special cases when iridectomy fails or is contraindicated.

Cyclodialysis—Modifications of Technic and Suggestions.—Czermak, W., suggests cyclodialysis preliminary to iridectomy in order to obtain the smooth separation of the root of the iris from the ligamentum pectinatum, in certain cases of chronic and absolute glaucoma, in which the performance of a regular broad and peripheral iridectomy is impossible on account of atrophy of the iris and adherence to cornea. He uses a bellied scalpel for dissection of the sclera and instils eserin after the operation.

Logetschnikow, S. (Rep. Ophth. Soc., Moscow, Oct. 31, 1906), uses a scalpel in performing Heine's cyclodialysis. He reports five cases, and claims as advantages the slight painfulness, reduction of tension, and absence of bad after-effects.

According to Heine (Rep. Heidelberg Cong., 1906, Muench. Med. Woch., 1906, p. 2) the principal advantages of his operation are: Less danger than in iridectomy; preservation of normal pupil and sphincter, cosmetic effect, applicability in complicated cases, as in hemorrhagic and secondary glaucoma, or in complete abolition of anterior chamber; possibly of repetition without difficulty or danger, and, finally, maintenance of the anterior chamber.

The gradual reduction of tension, as shown by usual persistence of tension for from ten to twenty-four hours after operating, is of great value, as, for instance, in hemorrhagic glaucoma and in buphthalmus, while in cases where it is necessary to reduce tension promptly this can be accomplished with ease by tilting the spatula and allowing the aqueous to escape at whatever rate we please.

Meller lays stress on the advantages of this procedure in absolute glaucoma with hazy cornea, shallow chamber and narrow rim of atrophic or adherent iris, and in secondary glaucoma due to a lens dislocated into the vitreous, where iridectomy is precarious and often impossible. Again, in secondary glaucoma coming on after combined extraction, in which it would be necessary to mutilate the eye by a second iridectomy downward and still further interfere with vision, a procedure which would be difficult as well as of doubtful value, cyclodialysis would be the procedure of choice.

The Dangers of Cyclodialysis are: (1) Penetration of the vitreous in making the scleral incision. This is followed by hemorrhage and often by prolapse, which may defeat the aim of the operation. The accident may be avoided, according to Heine, by paying attention to three signs of the sclera having been completely severed. These are: cessation of resistance to the cutting edge of the knife, the appearance of the uvea as a dark blue line in the depth of the incision, and ciliary pain. This is complained of as soon as the ciliary body is touched, while the scleral incision is hardly felt after the usual cocainization. (2) Injury to the iris. This may happen if the spatula is not held in close apposition to the inner surface of the sclera as it passes forward into the anterior chamber. (3) Hemorrhage into the anterior chamber. This is generally a result of iris traumatism. It may prevent reduction of tension and cause marked and painful reaction for a day or two. Secondary hemorrhage and transient opacity or hemorrhage in the vitreous are occasionally observed. Secondary irritation is generally noted for a day or so after operation, and disappears under eserin, hot applications, and, if necessary, morphin. There is no danger of wounding Schlemm's canal, as feared by some. Fuchs has pointed out that the spatula slides along the posterior surface of a scleral spur into the anterior chamber.

Cyclodialysis. — Pathological and experimental studies as to results and mechanics (Zeitschr. für Aug., xviii, 1907) analyzes Heine's results, and Krauss reports experiments on rabbits with microscopic examinations of two human eyes, twenty rabbits' and twelve cats' eyes. In all cases a solid cicatrix had formed at the site of operation, and the chorioid was tightly adherent to the sclera by scar-tissue, as was the ciliary body. The ciliary processes were either thickened by scar-tissue or atrophic. The iris near the detachment was atrophic, and invariably adherent to the cornea. The sinus of the anterior chamber was invariably obliterated at its base by cicatricial tissue; the anterior chamber was shallow at the angle corresponding to the iridodialysis and obstructed by cells and connective tissue fibers. Posterior endothelium and Descemet's membrane were often detached at operation, causing, at

times, lasting corneal opacity. Cyclodialysis produces cicatricial synechiæ, and supplanting normal by scar-tissue, causes atrophy of detached parts. Postoperative diminution of tension is explained, in cases in which aqueous oozed, by puncture of the anterior chamber, with filtration through the scleral incision, in others by atrophic changes in ciliary body due to the traumatism of operation and reducing secretion of intra-ocular fluids, bringing about a natural curve and, finally, by causing iridodialysis instead of the intended, useless, cyclodialysis. The sinus of the anterior chamber can be freed, at least lastingly, from on front without injury to the eye by the usual operations.

The objections, both practical and theoretical, of Krauss have been met by Meller (Graefe's Archiv., 1908), who reports a series of good results, and quotes the favorable verdict of Fuchs, Uhthoff, Axenfeld and a number of other experienced operators. The pathological findings in animal eves are not to be applied unrestrictedly to human beings. As a matter of fact, cyclodialysis does produce a deep filtration angle and probably a limited detachment of the chorioid, and whatever the theory may be, does reduce tension steadily and permanently. That this reduction is due to oozing from the scleral incision is disproven by its non-appearance until some time after operation. The atrophic changes postulated by Krauss as due to traumatism during operation are not produced by the operation, and are not present to a greater degree than in other glaucomatous eyes, where, as is evident, they do not reduce tension. The operation, when correctly performed, does not cause iridodialysis, and the latter, as is well known, can not be relied upon to reduce tension, as shown by the variable and, in the main, unsatisfactory results of the procedures devised by Knies, Nicati and De Vincentiis.

Conclusions and Statistics from Other Reports.—Heine reports favorably on fifty cases, including some previously iridectomized by Uhthoff. Sewall (Calif. State J. Med., May, 1907) reports one case of chronic simple glaucoma, bilateral three months after operation, vision as before, tension improved (but pilocarpin, used without much benefit before operation, had been continued). Boldt (Beitr. z. Augenh., 68, 1907) reports results of thirty-eight cyclodialyses on thirty-seven eyes, six failures, representing all forms of glaucoma. Considerable and lasting reduction of tension, twenty-five; more or less favorable influence, thirty-one. Iridectomy to be preferred in acute and subacute glaucoma, cyclodialysis not advisable in prodromal stage, but may supplant iridectomy in

simple and chronic cases. In hemorrhagic glaucoma it is less dangerous than iridectomy, as in juvenile glaucoma, dislocation of the lens, high myopia and buphthalmus, where it is to be followed by the use of myotics.

Cutler (Ophth. Section, N. Y. Acad. Med., Feb., 1906), Acute glaucoma, T.+2. wide pupil, shallow anterior chamber. Cyclodialysis. No hemorrhage, little pain, and no reaction. T. fell and remained normal for a week, then rose suddenly. The operation was repeated, but as the outlook did not seem good, iridectomy was also performed, and tension has remained normal. acute cases the results may be better, but Cutler thinks the procedure valuable chiefly as a preliminary to iridectomy where the anterior chamber is shallow, especially if the coloboma can be placed at the point where the angle has been opened, thus greatly increasing the chances of maintaining a permanent patency of the filtration angle. Few of the attempts made from the anterior chamber, such as anterior sclerotomy or De Vincentii's operation, reach the ligamentum pectinatum, and even in iridectomy the root of the iris is seldom reached, so that it is still a problem why it is so often successful and how it acts.

Dolganow, W. (Praktitsch, Wratch, 1907), reports brilliant operative results of cyclodialysis in eleven out of twelve cases of "acute absolute glaucoma." Pain disappeared within three or four hours after operation and tension remained low while the patients were under observation (two weeks to three months). In one case there was persistence of pain, and the eye finally had to be enucleated. D. finds the operation according to Heine easily performed but very painful. Hemorrhage into the anterior chamber is usually not severe, and is absorbed completely in from seven to ten days. The after-treatment is short, and the operation does not require the patients to be confined to bed.

Weekers (Klin. Monatsbl. für Aug., xlv, II, 232) reviews the history of cyclodialysis, and reports five cases of his own, with one histological examination. His experience with this procedure is not encouraging. It certainly appears to be dangerous in hemorrhagic glaucoma, and often barren of results and ineffectual in chronic forms. A definite judgment can hardly be formed until further observations have been made, but in the light of our present experience the results in severe, protracted cases are by no means what we could wish.

Operations Based on Extra-Ocular Drainage (Trans-Scleral or Sub-Conjunctival Filtration).—In this class of operations filtration

was to be established from the anterior chamber through a permanent opening, or fistula, in the sclera. This sub-conjunctival fistula was to be produced either by resection of portion of the wall of the globe under a conjunctival flap, or by incarcerating sub-conjunctiva, iris, or other tissue or even foreign body, into the section, and thus preventing complete or permanent closure of the wound. These two divisions are represented by trephining of the sclera, posterior sclerotomy with massage (Dianoux), jagged sclerotomy (Herbert, 1903), combined sclerotomy (Lagrange), on the one hand, and by iridencleisis (Holt), sub-conjunctival fistula (Herbert, 1907), on the other.

Another departure was based on the good effects of iridectomy in which the scleral incision had failed to heal smoothly, and in which this abnormal healing was followed by more or less constant oozing of fluid through a permeable scar. Histological studies showed that these filtration cicatrices were produced in two ways. Either the section was irregular, so that temporary closure was afforded only by the conjunctival flap, or there was prolapse of iris or of vitreous between the lips of the wound. In the former case the scar was generally ectatic but not cystoid or protruding. In the latter case the prolapsed tissues protruded more or less above the level of the sclera, depending on the degree of intraocular tension, acting as a sort of safety valve, and giving way when the pressure reached a certain height. De Wecker was one of the first to recognize the value of a filtrating scar and devised means of so performing the scleral section as to insure its development. The substitute operation for the formation of cystoid sear forms the second large group of procedures for relief of persistent high tension. accordance with the histological data just mentioned there were obviously two ways, theoretically, of producing a permeable cicatrix, one by intentional irregularity of the scleral section, or actual excision of portion of this membrane, to allow sub-conjunctival filtration via an open selera, and, secondly, prevention of firm healing by producing a prolapse of iris into the wound or of other tissue. This is the idea underlying the procedures of Holth, iridencleisis, who used the iris, and of Herbert, who invented the conjunctival flap through the seleral incision into the anterior chamber.

Herbert suggested the introduction of a capillary glass tube, and Holth used silver wire to hold the inverted conjunctiva in the anterior chamber.

Herbert (Ophth. Soc. U. K., Ophth. Rev., 1903), sub-conjunctival fistula in chronic glaucoma, reports forty-eight cases, valuable

to replace or follow ineffectual iridectomy. Infection and sympathetic irritation are theoretical objections. Reduction of tension and relief of pain are sure and lasting, but take time, as for the prolapsed iris to become permeable, so that primary diminution of tension following scleral section may be followed by a slight increase, lasting up to two months, which is usually controlled by eserin and massage. A small iridectomy should be combined with this operation, especially if the iris tissue is thick or fibrous. Section with Graefe knife 4 to 5 mm. long in sclero-corneal margin, forming a conjunctival flap which is inverted into the anterior chamber and held in position against the posterior surface of the cornea by means of a suture.

Iridencleisis Antiglaucomatosa.—Holth (Heidelberg Ophthalmological Society, 1906) notes the good effects of a cystoid scar. The latter is always a slight accidental incarceration of the iris in the wound. In these cases the vision remained good, and tension normal. Other eyes, originally in better condition, became hard and blind in spite of the iridectomy. Since August, 1904, after experiments on rabbits, Holth systematically practiced subconjunctival incarceration of the iris, in order to produce a fistula into the anterior chamber. To avoid infection the conjunctival incision is placed 10 mm. from the limbus. The sclero-corneal section is 6 to 8 mm. long. This results in a bleb formation of the conjunctiva. Usually a fistula lined with pigment epithelium is formed which reaches into the subconjunctival connective tissue. This was demonstrated histologically in one case, but its presence is not essential, as normal tension can be maintained, though less surely, perhaps, by communication of the uveal vessels and lymphatics with the subconjunctival channels. The operation was performed in forty-one cases. In eleven iridectomy had preceded, and in twenty-one an iridectomy, in nine an iridotomy was immediately added. Two cases did badly because the iris drew back into the anterior chamber on the day of operation. In three tension fell, but not quite to normal. In thirty-five cases, 87 per cent., normal tension was obtained, immediately in thirty-one, after a few months in four. After one week there is some iritic irritation. Iridectomy is unnecessary for the incarceration; it can be replaced by meridional iridotomy if the coloboma is desired. A small peripheral, angular iridotomy with incarceration of the flap should leave a round, central pupil. In previous experiments by Bader (1873) and Herbert (1903) only the anterior surface of the unwounded iris appears to have been used for the incarceration, while the posterior surface formed a blind sac which did not contribute to the formation of a true fistula. The latter can be formed only by a fold of the posterior surface of the incised iris with the pigment epithelium.

Vollert (Muench. Med. Wochenschr., 1906, No. 50) has used this procedure with good results. The section must be made at some distance from the limbus to avoid possible infection of the incision. Forty-one cases were operated on with better results than are usually obtained with iridectomy.

The dangers of prolapsed and adherent iris were avoided in the form of cystoid scar formation which depends on exsection of a portion of sclera. The principal exponent of this idea was Lagrange, who in 1904 devised a combination of iridectomy with exsection of a sliver of the anterior lip of the scleral wound, covering the section with a conjunctival flap formed by the Graefe knife during the incision which was placed 2 mm. back of the limbus and followed by a typical glaucoma iridectomy.

Production of a Filtering Scar in Chronic Glaucoma.—Lagrange (Ophthalmoscope, Sept., 1907, Arch. d'Opht., xxvii, p. 181) makes a scleral incision with a Graefe knife, finishing with a conjunctival flap; then with a very sharp pair of slightly curved scissors cuts out a crescentic slip from the corneal lip of the wound, and completes the operation with a broad iridectomy. At the Oxford Ophthalmological Congress, Lagrange reported thirty-three successes. Eserin is instilled before operation.

The incision runs about 1 mm. back of the limbus and is intended to open up the angle of the anterior chamber. In cutting out through the sclera the knife blade is turned slightly backward to produce a long beveled anterior wound lip and a fairly deep conjunctival flap is cut through about 5 mm. back of the scleral section. The resection is made with fine scissors, sharply curved on the flat, and the cutting is done with the convexity of the blades toward the surface of the globe. The iridectomy should be wide and extend to the root of the iris, the latter being drawn away from either angle of the wound as it is snipped off with two cuts of the scissors. During the iridectomy the conjunctival flap is laid back on the cornea and held with forceps.

Lagrange claims that this sclerectomy at the level of Schlemm's canal produces a permanent filtration cicatrix without the dangers incident to methods involving incarceration of iris, conjunctiva or other tissue into the lips of the scleral section. It will permanently reduce hypersection in persistent glaucoma. Simple glaucoma is

merely chronic glaucoma with evanescent, intermittent, fugaceous, or slight increase of tension, and should be treated by this operation. Cases due to vascular sclerosis will, of course, go on from bad to worse, and optic nerve atrophy with excavation will progress, but plus tension is abolished forever.

Herbert (Ophthalmoscope, June, 1907) classifies permeable cicatrices as cystoid, filtering and fistulous. A filtering scar is smooth, and has no dark points which are fistulæ. Such a scar is common in Bombay after cataract extraction with a broad conjunctival flap. Pressure on the globe, years after operation, will cause the eye to become soft and gives rise to very distinct chemosis. This is the kind of scar, exactly, which has long been desired in the treatment of glaucoma. Herbert began by making one or both lips of a corneal-scleral incision as jagged and uneven as possible, using a narrow knife and aiming to produce a weak sear by preventing primary union. This proved unsatisfactory, as did the method of Lagrange. He then proceeded to isolate a wedge of sclero-corneal tissue which, being cut off from its blood supply, and pushed out of place, would act as a kind of graft which should shrink and provide for filtration. The incision is small and made slowly with an old ground-down Graefe knife 4/5 mm. wide. It must taper from heel to point. The conjunctival incision is made 1.5-2 mm. above the intended incision section, the loose fold of conjunctiva being pushed down with the knife point. The corneo-scleral puncture is made with the blade nearly transverse and the cutting edge upward. When the counter-puncture has been made the blade is turned in the wound and puncture and counter-puncture enlarged with the cutting edge downward. This gives room to twist the knife again for the secondary incision, which is made forward and upward in a direction normal to the corneal surface. The primary incision is then completed subconjunctivally to isolate the wedge, which is quite narrow, measuring vertically 1/2-2/3 mm. The conjunctival flap is cut with a narrow undivided bridge. A minute "peripheral buttonhole" iridectomy is made to prevent iris inclusion.

Henderson, T. (Brit. Med. Jour., Nov. 2, 1907) believes primary obstruction and closure of pectinate ligament due to sclerosis of fibrous structures about filtration angle to be the main causal factor in glaucoma, all other changes, such as peripheral anterior synechiæ, being secondary. All drainage then devolves on the iris. Blocking of the filtration angle is due, indirectly, to acute iritic edema, and is not, itself, a cause of glaucoma. Shallowing of anterior chamber is caused by increased diameter of the lens, as

ciliary edema causes relaxation of the suspensory ligament. Myoties stretch out iris tissue and open crypts on anterior surface. thus enlarging drainage area, while iridectomy accomplishes the same object. Henderson claims that the value of Lagrange's as well as Herbert's operation is due entirely to the coincident iridectomy, and that the cicatrix, if free from iris, must heal and be sealed up by the posterior endothelium, and by a plug of "intercalary" connective tissue from the episclera and subconjunctiva. He notes that Butler produced a filtering cicatrix cataract extraction, but at the end of three weeks it ceased to filter and the wound healed soundly. Iris tissue seems indifferent to trauma when not complicated with toxic or septic agencies. No reparative process takes place, and no scar is formed, no connective tissue is laid down after detachment from ciliary body, and no reaction follows hemorrhage into the stroma. Years after an iridectomy the cut surfaces remain as when first severed, the anterior epithelium does not cover them nor the pigment layer grow over them, and no wandering cells cover their surface with connective tissue. short, there remains an open, raw, and unhealed area in free and open communication with the aqueous of the anterior chamber. This explains why iridectomy is so successful in acute glaucoma; a permanent drain being opened up for the aqueous to transude into the circulation. If, however, the iris stroma be atrophic, as in many cases of chronic glaucoma, the iridectomy is often unsuccessful.

These conclusions from histological findings can not be accepted for clinical purposes without limitation. Practical experience teaches us that filtration scars, especially after iridectomy, may remain permeable for years. Wagemann and Gepner, years ago, showed that the restoration of continuity in the posterior lip of corneal and sclero-corneal wounds by proliferation of the endothelium required several months, at least, and that the process had been overlooked by previous investigators for this very reason, the globes having all been examined within a month or two after operation. A further objection to Henderson's conclusions lies in the nature of his material which could only show the process of woundhealing after section for cataract extraction. Now, Czermak and others have shown that there is a radical difference in the course of healing of wounds which come into direct apposition immediately after completion, and those in which, as in most cases of glaucoma, there is a tendency for the inner lip, at least, to be kept from primary union by continuance or recurrence of high tension.

The latter factor undoubtedly accounts in many cases for a condition in which we have subconjunctival drainage through permeable but not necessarily protruding or cystoid scar, acting as a safety valve for hypertension with regularly alternating phases of separation of the wound margins, subconjunctival accumulation of intraocular fluid, and plus tension, on the one hand, and gradual oozing, diminution of tension and coaptation of the wound on the other. This takes place most easily, of course, if the scar is formed of intercalary subconjunctival tissue, but even reunited scleral tissue allows some transudation, and this is not completely prevented until the continuity of the endothelium has been re-established.

Lagrange gives a report of additional cases treated by his combination of sclerotomy and iridectomy (Arch. d'Opht., July, 1907) which, he claims, is of special value as compared to iridectomy in cases of simple glaucoma, a disease characterized by persistent hypertension. This is often slight in degree, almost if not quite inappreciable by palpation, and intermittent in character, so that it may be absent at the time of examination. This history is one of rainbow vision, colored halos about lights, obscuration of vision, characteristic contraction of the nasal field for white, with preservation of normal limits for peripheral color perception. In some cases vision is hardly if at all affected, and hypertension may not be detected, but it has been present as a result of "emotion, overwork, or some moral or physical fatigue." In such cases the effect of iridectomy is transient, while Lagrange's operation permanently reduces tension.

Weeks (Ophth. Section, N. Y. Acad. Med., January, 1908) presented a number of cases of simple glaucoma operated on by the method of Lagrange. Double operation in two, single in two cases. Broad iridectomies were performed. Intraocular pressure was reduced to $T+\frac{1}{2}$ in one case and to normal in the others, which had been under observation from five weeks to three months. The conjunctiva over the scleral defect was edematous. In view of the tendency for a gradual firm closure of wounds of this nature, the final results must be decided by later observation.

A review of the literature shows that it is still too early to form a definite judgment as to the final results of either Heine's or Lagrange's operation. The favorable statistics of the latter procedure may be due, wholly or in part, to the iridectomy which accompanies it.

The fact that Lagrange's operation includes iridectomy somewhat diminishes its usefulness, too, laying it open to the same

objections that have been raised to the latter procedure. This is most obvious in cases where dangerous hemorrhage is to be feared or has actually taken place in a previous operation either on the affected eye or its fellow, in cases in which the iris is atrophic or adherent, and to a certain extent in extreme hypertension with shallow anterior chamber where there is danger of wounding the lens, or where sudden diminution of tension is apt to be followed by intraocular hemorrhage, or by prolapse of iris or vitreous. The last objection is less grave, as the sclerectomy may be depended upon to diminish tension sufficiently to allow an iridectomy to be performed lege artis without injury to the eye.

In cyclodialysis, too, it has been advised to perform iridectomy, and so to get the undeniable benefit of a complete freeing of the angle of the anterior chamber and trans-iridic drainage, plus whatever value the establishing of supra-chorioidal filtration may possess.

The most evident objection to cyclodialysis is the difficulty of performing a clean operation without injuring the ciliary body. The danger of vitreous prolapse, of hemorrhage, and of detachment of Descemet's membrane must also be considered. To these purely technical difficulties we must add the possible insufficiency of the filtration channel via the supra-chorioidal space, and, in any case, the question of its permanency.

DISCUSSION ON PAPERS OF DRS. BROWN AND FRIDENBERG.

Dr. Jackson:-With reference to Dr. Fridenberg's paper, I was favorably impressed with Herbert's original description of his operation to secure a filtering scar, not a cystoid scar, and tried it over fourteen months ago. That case is still under observation, and the tension has never been above normal since. It was a case of secondary glaucoma. I did an iridectomy, making a Herbert incision. I have not used Lagrange's incision, but it strikes me as clean and simple. I have within the last two weeks seen a case that bears upon it and upon the simple sclerotomy of Bettremeiux. Two and a half years ago I excised a sarcoma of the limbus, and at that time, the growth being adherent to the sclera, removed about two-thirds of the thickness of the sclera over an area 3 by 4 mm., leaving a black window in the sclera. That window gradually closed with granulation tissue that became white connective tissue. Now the appearance of this area is decidedly bluish and transillumination shows it much thinner than other parts of the sclera. The tension is normal. The sclera has been replaced with a thin membrane that serves the purpose of the sclera without any tendency to general drawing in. It seems to me that Lagrange's excision of sclera might be made larger than it is usually made, without particular risk, and if it does give a permeable scar, as it is claimed to do, it might be serviceable in glaucoma. I would leave it for those cases which usually fail to yield to iridectomy.

With reference to cyclodialysis, it seems to me the risk of wounding the uveal coat, which is the chief risk of the operation, would be greatly lessened by doing for that what we have frequently done for iridectomy, preliminary posterior sclerotomy. While Mueller proposes it shall replace the preliminary posterior sclerotomy, in some cases it seems to me there would be less danger of cutting through the chorioid, and cyclodialysis could be done more easily, if the tension were lowered before undertaking it. Any extensive operation approaching the ciliary region permits expansion of the globe at that point. At the junction of cornea and sclera there is something of a re-entering angle on the eyeball. The coat is very thick as compared with the posterior or anterior parts. If you weaken it at that point, even by an inflammatory process, you permit the ball to become larger. This must be important, if the size of the lens and its pressure on the ciliary processes is a factor in causing glaucoma. Hancock's operation is highly spoken of by those who have used it, and it was effective in a case I watched four or five years. It permits an enlargement of this ciliary ring, and in that way removes the ciliary process as from the large senile lens.

Dr. Vail:—I never saw this occur spontaneously in but one case, and that was in a myope of high degree. A myope of sixteen years of age had chronic recurrent inflammatory glaucoma, and the cupping was the most pronounced I have ever seen. There was not alone staphyloma as seen in an adult, but the deepest ampullation of the optic nerve, rendering the case remarkable. The optic nerve entrance looked like a rat hole. This case went on to destruction.

Dr. Greene:—I have only seen one case such as we are considering, and that was in a boy of ten. He had lost one eye under the care of a competent oculist. From the history it seems that an older sister had gonorrhea. One eye was lost from panophthalmitis. Whether he infected the eye with gonorrhea which his sister had can not be known, although I was informed he had no evidence of having the disease himself. The remaining eye had medium central leukoma, high tension and great cupping of the disc. I made an iridectomy two years ago. I have watched him since twice a month; 20/70 vision has been maintained under eserin, and the field has remained about 1/4 of normal T=+1. He has suddenly developed an acute inflammation, the first since I have had him under observation, but it has subsided under eserin and he remains in statu quo.

Dr. Alt:—Some years ago I reported a case in my journal of a young girl eleven years of age who came to my office from a Western city, where she had been examined for glasses with cycloplegia, and the instillation of atropin had caused an attack of glaucoma in both eyes. I saw her during the attack. I knew at first nothing about the history of the case, but she had a well defined glaucoma when I saw her. I put her on eserin, and when a day or two afterwards I saw her again the hypertension was relieved. I know nothing about the outcome of the case.

Dr. Campbell:—I saw a case this summer of infantile glaucoma in a child less than ten months old. There were undoubted glaucomatous manifestations in both eyes, hazy cornea and tension of plus 2. There was considerable improvement in the condition from the use of myotics, and I would like an expression from the society on the influence of operative measures in so young a child. I am rather uncertain as to the propriety of operative interference in these cases of very young children.

DR. BAKER:—I have had under my care during the past three years an eleven-year-old girl with chronic glaucoma. There is the deepest cupping of the disc that I have ever seen. My first diagnosis was congenital staphyloma of the optic nerve. There was never any increased tension, but loss of vision was progressive, so that in one year she could only count fingers with one eye, and in the other the vision was reduced to 20/200. When I insisted upon making an iridectomy other advice was

sought. Among others, deSchweinitz was consulted, who concurred in the diagnosis of glaucoma, and advised iridectomy. This was refused, and the patient taken to a Christian Science healer.

Dr. Reeve:—The historical reference by Dr. Fridenberg recalls a picture as vividly as if seen yesterday. It was in the anteroom of the Section on Ophthalmology of the International Congress in 1881, in London, a series of cases in which you could see, twelve feet off or further, very marked protrusion of the upper lid: cases illustrating Barber's operation by sclerotomy with prolapsus of the eye, done previously, and of which he seemed rather proud. At the discussion, at which some of the leading ophthalmologists of the year were present, Dr. DeWecker said with some vim and warmth that, while he did not deny that the tension was reduced, the method was in distinct violation of the well-recognized principles of ophthalmic surgery.

DR. FRIDENBERG (closing):—I was interested in having Dr. Jackson give his personal experience in the operation, especially as I find it difficult to grasp the description of the operation as given by Dr. Herbert; he gives it as leaving a wedge-shaped section of sclera to shrivel. Exactly how he does it is difficult to say from the description. Henderson claims that both Lagrange's and Herbert's operations are valuable only inasmuch as they are combined with iridectomies. He says if you exsect a portion of the sclera it will heal in course of time, whether large or small, but he claims the value of both are absolutely and only due to the fact that an iridectomy is combined with them. Dr. Jackson referred to the possibility of improving the technic. As to enlarging the capacity of the eye, it holds in Lagrange's, but Heine claims it is not so in his operation, as the incision is only one or two millimeters wide and does not gape.

Dr. Brown (closing):—Dr. Jackson spoke of the relative size of the lens and the globe as a factor in the production of glaucoma, especially in those cases occurring in young children. In Cases 3 and 4 of my report, being sisters, I wish to recall that in the younger there was an anomalous position of the lens, so that it was undoubtedly by pressure irritating the ciliary body, and in this way probably was a factor in the production of high tension. I have aimed not to discuss the ordinary phases of glaucoma in this paper. I have brought with me some specimens which might be of interest to some of the members of the Academy. One of these is the ruptured globe in the older sister (Case 3 in my report), showing an immense hernia of the iris and ciliary body from the accident causing the rupture of the globe, but despite which one can easily see the greatly enlarged dimensions of the globe itself.

HEREDITARY BLINDNESS AND ITS PREVENTION.*

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About a year ago my attention was called to the family history of an inmate of the Missouri School for the Blind, which showed the presence of cataract in all the members of the family for at least five generations. The first member of whom there was a record was:

W., male, blind. He had two sons, both of whom were blind. One of them had a son, M. F. W. The other had three children. All four of the children were blind, and M. F. W. is known to have had cataract. It is a fair presumption that the others, their fathers and their grandfather also had cataract. M. F. W. had four children, who constitute the fourth generation. They are:

(1) M. W., female, congenital cataract; married E.; they had

one child.

(2) S. R. W., male, cataract at age of 3 years; no children.

(3) W. H. W., male, cataract at age of 2 years; no children. (4) F. M. W., male, congenital cataract; married I. P., blind, but no cataract. They had one child.

The fifth generation consisted of G. E., son of M. W., and L. W., daughter of F. M. W. Both had congenital cataract.

The family came originally from North Carolina, and in the list of pupils of the school for the blind of that state are to be found two of the same name. The degree of relationship, if it exists, is not known.

The question was asked, Whether or not such a case constituted grounds for preventing blind persons from marrying? to which, of course, only one answer could be given, viz.: that it was necessary to determine the exact rôle which heredity plays in blindness before such a radical step could be taken. It is the fruits of investigations along this line which are here presented.

The problem to be solved naturally divided itself into two questions: first, is there such a thing as hereditary blindness, and, second, which is the best method of combating it?

Inasmuch as blindness per se is usually so formidable for sociologic rather than pathologic reasons, the term in this paper will

^{*}This is body of this paper—the statistics were so voluminous that the publication committee deemed it proper not to publish them. The doctor's views and conclusions are plainly stated in this abstract.

be used to designate those cases where "there is a state of permanent diminution of vision sufficient to seriously impair the patient's chance to earn a livelihood." It does not include those cases where by the use of proper glasses or proper medicinal treatment the vision is restored to practically normal, but does include those cases where an operation is necessary before the patient has a good working vision. The former class is excluded because the use of glasses is as much a recognized necessity to-day as the use of clothing, and because diseases amenable to treatment are only temporary in their bad effects. Where an operation is required, however, be the surgeon as skilful as he may, there is always a certain element of danger either to the eye or to the life of the patient, if a general anesthetic is employed, which makes the condition a much more formidable one.

With this introductory definition it will be possible to take up the question:

IS THERE SUCH A THING AS HEREDITARY BLINDNESS?

Upon purely theoretic grounds it can not be denied that hereditary blindness is at least a possibility. For the eye, no less than other organs of the body, must be regarded as the resultant of long ages of evolutionary progress.

The eye of the lower animals differs in many respects from that of man, but wherever found it is an organ specially adapted to the visual necessities of its possessor. It has come to its present state through a process of natural selection, those variations which tended to make the eve more serviceable to the species being preserved and inherited by succeeding generations, while those which made the eye of less value were lost in the early death of their unfortunate possessors. But, on the other hand, it is possible to conceive of a condition of life where acute vision would be unnecessarv, not to sav harmful. Under such circumstances, the possessor of a non-functionating eve could easily survive and bequeath to its descendants its own special variation. If they in turn survived, the same process would continue until that type of eve became the type of the species. This has actually happened in the case of the blind fish of certain caves of Indiana and Kentucky. In the state of total darkness which there obtains, an eye of the anthropoid type, for example, would be absolutely superfluous, and we find that the eves of these fish are in a very rudimentary stage. Whether they are considered as eyes in a state of arrested development or of retrogressive metamorphosis, they are undoubtedly the result of

many generations of inherited adaptation to environments. If, then, in a state of Nature, where the law of the survival of the fittest finds its widest application, there are forms of life proving the actuality of the inheritance of abnormal eyes, can there be any doubt that the same will obtain in a state of society, or civilization, if you prefer, where the element of altruism enters? If the blind patient is the child of rich parents, he is the object of all the care that wealth, guided by love, can bestow. If his parents are poor. the doors of our eleemosynary institutions are opened for him. The end-result is the same. An attempt is made to bring the child to adult life, in spite of his ocular imperfection. If he marries a person with normal eyes, who shall say that the tainted state of the one will not have as great an influence on the eyes of their children as the normal state of the other? If both parents are blind, especially if the nature of the blindness is the same in both cases, is it not reasonable to suppose that the children will be affected to a great degree by the combined ocular stigmata?

I have been at pains to make this clear, because some physicians have denied the possibility of hereditary blindness. Not only, however, is it theoretically possible, but it is also theoretically probable.

But, after all, theoretic considerations are at best poor substitutes for actual facts, and are valuable only when confirmed by statistics. Of the latter, there are two sources: first, the unrecorded experiences of the practitioners of to-day, and, second, a review of the literature. To ascertain as far as possible the number of cases of unreported hereditary blindness, the following letter was sent to 1,750 oculists and superintendents of institutions for the blind in America and Europe:

Dear Sir:—There has recently come to my attention a case of hereditary blindness where congenital cataract occurred in the off-springs of parents both of whom were blind. This deplorable state of affairs, in addition to arousing pity for the unfortunate fruits of such marriages, brings up the question of the advisability of discouraging such unions, either by law or precept. It is, however, first necessary to determine whether such a case as I have quoted is the rule or the exception, and this can be done only by collecting statistics from the records of physicians and of institutions for the care of the blind. To this end, the Scotoic Aid Society of Missouri, a society for promoting the economic welfare of the blind, requests the courtesy of answers to the questions indicated in the attached circular. Of course, all names of patients will be omitted in the published report, a copy of which I shall be glad to send you

if desired. The names are wanted only so as to avoid duplication. It is requested that the answers conform as much as possible to the scheme outlined in order to lighten the task of classifying the statistics.

Thanking you in advance, I remain, Yours very truly,

With this circular letter was the accompanying blank for the recording of data: (Page 250.)

In Appendix A will be found some of the replies received. To summarize here, answers were received to 152 letters; the remainder were either missent or the recipients did not regard the matter as of sufficient importance to merit a reply. The answers fall conveniently into the following divisions: Fifteen approve of the marriage of two blind persons, for sentimental or economic reasons; thirty-one approve of the marriage of a blind person with one of normal sight, for sentimental or economic reasons; thirtysix discourage the marriage of two blind persons, for sentimental or economic reasons, and ten discourage the marriage of a blind with a seeing person for the same reasons: fifty-eight discourage the marriage of two blind persons, where the disease is congenital or hereditary, on account of danger to the offspring, and forty-two discourage the marriage of a blind with a seeing person for the same reason; sixty-five letters were received acknowledging receipt of the circular letter of inquiry, but for various reasons no opinion was given. In the remaining eighty-seven, sometimes only one question was answered, sometimes both, with the various reasons for the answers given above.

The result of the inquiry would tend to show that the majority of those who come into professional relationship with the blind are either unacquainted with or are indifferent to the dangers of hereditary blindness. Of the answers received, however, the great majority (84 to 15) are opposed to the marriage of two blind persons. A smaller number, but still a majority (52 to 31) are opposed to the marriage of a blind with a seeing person. The reasons advanced by those who favor the latter marriage are that the house is run better and the children better taken care of when at least one of the parents has normal sight. This is undoubtedly true, although the argument is a strictly economic one. But the additional reason is brought forward, frequently, that there is much less danger to the offspring than when both parents are blind. This argument is, at first sight, a valid one, but is really fallacious. In the first place, the percentage of blind people with

hereditary disease as compared to those with other forms is very small, probably not more than 10 per cent. So no more than onetenth of all blind people are capable of transmitting their affection to their children. Another fact noted by several authors is that children affected with hereditary blindness frequently die young. So that the chance of two people affected with any form of hereditary blindness marrying is small, and the chance of these two having the same form of hereditary blindness, so that the cumulative action of two tainted lines of ancestry would have an influence, is very small, indeed. As a result, most of the cases of hereditary blindness reported have been those where only one parent was blind. The argument, therefore, should not be that where one parent has normal sight there is only one-half the chance for hereditary transmission, but should rather be that, inasmuch as the danger is so great where only one parent is blind, it must be still greater where both are affected. As a matter of fact, the percentage of affected children in both cases is about the same, though the small number of reported cases of double parental blindness makes the statistics of that form less reliable.

Both forms of marriages should be weighed in the same balance, and the victim of hereditary blindness must either be allowed to marry whom he desires, or must be prevented from marrying at all. As to the blind, who do not suffer from hereditary blindness, their fate must be settled upon economic and sociologic grounds, the discussion of which is beyond the province of this paper.

If there seems to be a lack of interest or of cases in the present generation of oculists, there is certainly no paucity of reported cases. It has been possible to collect 496 references, which are given in an abbreviated form in Appendix B. Where possible, they have been grouped under their respective heads. Where this was impossible, they have been included under the head of General Diseases. This includes cases of amaurosis from pre-ophthalmic times, cases of inherited ocular disease whose number is too small to possess statistical value, those where one form of blindness was succeeded by another, etc. From a study of the literature, as well as the cases reported in the replies received, it can be stated that there are 12 forms of blindness distinctly characterized by the property of hereditary transmission, viz.: albinism, aniridia and coloboma iridis, anophthalmus and microphthalmus, atrophia nervi optici, cataract, ectopia lentis, family degeneration of the cornea, glaucoma, megalophthalmus, nystagmus, ophthalmoplegia externa and ptosis, and retinitis pigmentosa. In addition to these may be

mentioned color-blindness and refractive errors. But the former has an economic aspect only in relation to certain occupations, and the latter are usually capable of being corrected by glasses. So, while they may be very inconvenient conditions, they are not of as vital importance as the other named, and the few cases noted are classed under the head of General Diseases. The disease called amaurotic family idiocy has an unique status. For, while the condition is undoubtedly hereditary, the patients, so far as I know, have invariably died in infancy, thus cutting short the line of taint. Consequently it has not been considered in this paper.

Outside of these, practically the entire range of ocular disease is free from hereditary influences. From the standpoint of a physician, there can be no reason for restricting patients suffering from these non-hereditary diseases from marrying, especially if one of the parents can see enough to take care of the house and the children. The question then becomes a purely economic one, with which this paper has nothing to do.

Hereditary transmission of disease may take place in one of two ways: first, the same disease may be present in the one who inherits and the one who transmits it; second, the diseases are different in the two persons, but bear a close relationship to one another, which may be called correlation. For instance, one child may have retinitis pigmentosa, another may be a deaf-mute, and a third may be an idiot, etc. This association of diseases occurs too often to allow it to be called coincidence.

The first form of heredity is called similar, and the second dissimilar heredity. In this paper, only similar heredity has been dealt with, as it was felt that investigation of dissimilar would complicate a none too clear subject. Similar heredity, and for that matter dissimilar also, occurs in three forms, viz.: direct, indirect, and collateral.

- 1. Direct Heredity.—In this form, the same disease is found in parent and child. Other members of the parent's family may be affected also.
- 2. Indirect Heredity.—In this form, one or more children suffer from a disease from which the parents are free, but which is present in one or more ancestors, uncle or aunt. The disease is said to be latent in the parent, who transmits only the tendency.
- 3. Collateral Heredity.—In this form, two or more children suffer from a disease which is not found in either of the parents or any of their relatives, with the possible exception of cousins of the same generation. A more exact family history frequently reveals

the fact that one or more ancestors suffered from the disease, whereupon the form changes from collateral to indirect or direct, usually the former. Collateral heredity is frequently found in children of consanguineous parents, which is probably due to a cumulative action of two lines of tainted ancestry, either of which by itself was too weak to affect the parent.

It should be remembered that if we trace back the hereditary taint, even if it be through several generations, we will ultimately reach an ancestor where the disease originated de novo, either from accident, disease, congenital malformation, maternal impression, or whatever the cause may be. Therefore, it seems to me of minor importance to determine what proportion of blind persons suffer from hereditary disease. If we have a patient with microphthalmus, it is of little benefit for us to know, as Magnus says, that 7.41 per cent. of all of his cases of congenital amaurosis suffered from this disease. But the other phase of the question, viz., how many of a blind parent's children will become blind as a direct result of their parent's blindness, that is, indeed, a vital point.

No man should be held responsible for the condition of his ancestor's eves, but if it can be shown that in the past a large percentage of children have been affected with the same ocular lesion as their parent, then two conclusions seem to me to be inevitable: first, that the past is the index of the future, and that, therefore, practically the same percentage will continue to obtain. This is so axiomatic that one of the most exact of modern businesses is based on it, that of life insurance, which estimates the number of deaths in a given number of individuals at a certain age on the basis of the number of deaths that have occurred at that age in the same number of people. It does not say who will die; it merely foretells the number. In the same way, the fact that a parent with hereditary blindness has a number of normal children is no absolute proof against the heredity of that disease. Somewhere there is another parent with enough blind children to restore the balance of the percentage.

The second conclusion is that, inasmuch as childhood is dependent on parentage, it is our duty as oculists, alive to the responsibility of eradicating eye diseases as far as possible, to recommend, first, that no person suffering from these forms of eye diseases which have been named be allowed to marry; second, that persons coming from families tainted with diseases showing a high percentage of indirect heredity, though they themselves may have normal eyes, should be advised not to marry, and, third, that parents hav-

ing two children suffering from a disease whose collateral percentage is high, should be warned of the danger to subsequent children, with the advice that they check the disease at that point. These recommendations rest on the assumption that the percentage of affected children is high, at least 33½ per cent., or one in every three children. On the other hand, if blind parents usually have normal children, or at the most a very small percentage of affected ones, we may well hesitate to interfere with their right to marry. The whole question, therefore, hinges on the percentage of blind children of blind parents.

In arriving at such a percentage, it is necessary to collect a large number of cases of the different forms of hereditary blindness mentioned above. Fortunately, the literature and the replies to the circular letters furnish a sufficient number of cases to enable us to arrive at a judgment. In estimating the number of families so affected, the following method was used: Every blind parentage and the blind or normal children therefrom constituted a family. If there were, for example, three generations that was equal to two families; that is, that of the grandfather and his child, and that of this child and his children. If there was more than one child in the second generation, each one with his children constituted a separate family. The attempt was made in each case to find out the number of normal children as well as the blind ones. Where none were mentioned, it was assumed that the reported children were the only ones. This is perhaps erroneous, but it was the only thing that could be done, and I do not believe that the number of unreported and normal children would alter the results materially. Where a child was reported normal, but far below the age at which the disease appeared in the other children, it was usually regarded as non-existent. Where there was any doubt, the normal children were always given the best of it. Where the normal children themselves had normal children, such families were not used in the calculation. For the purpose of the investigation is to estimate the number of blind children of blind parentage, and to include the normal children of normal parents, even though they belong to the same tainted family tree, would introduce an element of error into the calculation. This must be clearly understood, otherwise any attempt to verify the percentages arrived at will result in hopeless confusion.

Indirect heredity from grandparent to grandchild was, in addition, one family of direct heredity, where the parent of the grandchild was the normal child of the affected grandparent. It might

be questioned whether such a parent could really be normal, with a latent taint, but at least the advocates of the marriage of the blind can not object to this method of calculation. Indirect heredity from uncle or aunt to nephew or niece bears no relation to the parents of the children as far as direct heredity is concerned, merely showing a latent taint. One affected child in a family of one or more children of normal parents, where some uncle, aunt or ancestor was affected, was considered proof of indirect heredity.

Collateral heredity is found when at least two children of one generation are affected. If it were possible to know the condition of all the children of one generation, that is to say first cousins as well as brothers and sisters, the statistics would be more ample and perhaps truer. As it is, it was necessary to confine the calculation of collateral heredity to children of the same parents, where two at least were affected.

If only one child out of an absolutely normal family was affected it was evidently a case of *origo de novo*. Consequently there could be neither indirect nor collateral heredity, and direct heredity would be present only in case the affected child later had affected or normal children.

In Appendices A and B, each reference is followed by a statement of its direct, indirect and collateral heredity, showing the number of families, the sex of the parent affected, the total number of children and the number of affected and unaffected children. The following is a summary of these:

I. ALBINISM.

There have been reported in the literature 5 families of albinism showing direct heredity or lack thereof. The father was affected twice and the mother three times; there were 17 children, of whom 2 were affected and 15 not, a percentage of affected children of only 12 per cent. There were no cases of indirect heredity. Collateral heredity was found in 8 families, with a total of 43 children, of whom 21 were affected—48 per cent.

From this it appears that the danger from direct and indirect heredity is very small, while that from collateral heredity is, on the contrary, rather great. A larger number of cases is required, however, before a positive and exact statement can be made of the rôle played by heredity in albinism.

II. ANIRIDIA AND COLOBOMA IRIDIS.

Fifty-eight families showing direct heredity have been reported. The father was affected 29 times and the mother 29 times. There were 152 children, of whom 113 were affected—74 per cent. To these must be added the cases reported by Dr. Pflugk, making 59 families; 29 fathers and 30 mothers affected; 156 children; 116 affected—74 per cent. Collateral heredity was present in 9 families, containing 31 children, of whom 23 were affected—74.2 per cent. Four families showed indirect heredity in 8 out of 12 children—66% per cent.

These percentages clearly show that heredity is a very vital factor in the ocular states of children born into a family, any member of which shows aniridia or coloboma iridis.

III. ANOPHTHALMUS AND MICROPHTHALMUS.

In 23 families, 9 fathers and 14 mothers showed direct transmission; 37 of the 52 children were affected—70 per cent. To these must be added the cases reported by Drs. Pflugk and Komoto, making 26 families; 11 fathers and 15 mothers affected; 57 children; 40 affected—70 per cent. Indirect heredity was found in only 2 families, all three children being affected—100 per cent. To these must be added the case reported by Dr. Pflugk, making 3 families, 4 children, all affected—100 per cent. Eighteen families showed collateral heredity, 41 of the 54 children being affected—76 per cent. To these must be added the case reported by Dr. Komoto, making 19 families; 56 children; 43 affected—77 per cent.

This condition shows an extremely high percentage of affected children. Of course, the indirect heredity is based on too few cases to possess a more than relative value, but in conjunction with the other percentages, the danger of marriage into a family, any member of which has anophthalmus or microphthalmus, is shown to be very great.

IV. ATROPHIA NERVI OPTICI.

Forty-six families have been reported showing direct heredity, in which there were 28 affected fathers and 18 affected mothers. Of the 120 children, 56—46% per cent.—were affected. Indirect heredity was present in 43 families, where 93 of the 155 children were affected—60 per cent. Collateral heredity was found in 59 families, with 221 children, of whom 154—69.6 per cent.—were affected. To these must be added the cases reported by Drs. Grauell and Merrill, making 61 families; 231 children; 163 affected—70 per cent.

Although all three forms of heredity are very important factors in this disease, collateral heredity seems the most dangerous, indirect less so, and direct least of all. The greater number of families of collateral heredity, but not its high percentage, is probably due to the fact that many cases of direct and indirect heredity started as collateral. A point of interest is the tendency towards indirect heredity from affected uncle through unaffected mother.

V. CATARACT.

Direct heredity of cataract was present in 286 families, the father being affected 135 times and the mother 144 times, unknown 7 times. Of the 965 children, 554 were affected-57 per cent. To these must be added the cases reported by Drs. Carroll and Trimble, Carter, Gifford, Green, Pflugk, Todd, Van Note, Weeks, Wood, and the author, making in all 304 families, 145 fathers and 152 mothers and 7 unknown affected; 1,012 children; 589 affected—58 per cent. Both parents were affected once; of their 8 children, 2 were affected—25 per cent. To these must be added the cases reported by Drs. Lewis and Minor, making 3 families of both parents affected; 15 children; 9 affected—60 per cent. Indirect heredity was found in 28 families, where 44 of the 106 children were affected-41 per cent. To these must be added the case reported by Dr. Pflugk, making 29 families, 107 children; 45 affected-42 per cent. Sixty-four families showed collateral heredity, 182 of the 298 children being affected-61 per cent. To these must be added the cases reported by Drs. Bruns, Carrol and Trimble, Carter and Komoto, making 68 families; 312 children; 193 affected-61.8 per cent.

In cataract also all three forms of heredity show a high percentage, although the indirect form is considerably less than the other two. As to the cases where both parents were affected, they are too few to base any judgment, except that the danger to the children when only one parent is affected is about the same as when both are affected.

VI. ECTOPIA LENTIS.

This condition was present in 18 fathers and 24 mothers, making 42 families. Of the 150 children, 106 were affected—70 per cent. To these must be added the case reported by Dr. Charles, making 43 families; 19 fathers and 24 mothers affected; 155 children; 109 affected—70 per cent. There were only 3 families showing indirect heredity; 6 of the 12 children were affected—50 per cent. Eighteen families showed collateral heredity; 40 of the 45 children were affected—88.8 per cent.

It is unnecessary to comment upon these figures.

VII. FAMILY DEGENERATION OF THE CORNEA.

Although it has been claimed that corneal affections are not hereditary, 18 cases of family degeneration of the cornea have been reported. The father was affected 10 times and the mother 8 times; 26 of the 62 children were affected—42 per cent. There was one family of indirect heredity with 2 children, both affected—100 per cent. There were 13 families of collateral heredity, with 50 children of whom 34 were affected—68 per cent.

VIII. GLAUCOMA.

Forty-three families of direct heredity have been reported, the father being affected 22 and the mother 21 times. Seventy of the 129 children were affected—54 per cent. To these must be added the case reported by Dr. Singleton, making 44 families; 23 fathers and 21 mothers affected; 131 children; 72 affected—55 per cent. There was only one case of indirect heredity, 4 of the 10 children being affected—40 per cent. Collateral heredity was present in 13 families, 33 of the 53 children being affected—62 per cent.

Although glaucoma was early recognized as hereditary, the percentage of affected children is not as high as in some of the diseases where this factor has not been emphasized.

IX. MEGALOPHTHALMUS.

Only one family showed direct heredity. The mother and her one child were affected—100 per cent. No cases of indirect heredity. Collateral heredity was found in 7 families, 20 of the 27 children being affected—74 per cent.

These high percentages are based on too few cases to be exact.

X. NYSTAGMUS.

Nystagmus, either alone or accompanying other diseases, was found directly inherited in 18 families, the father being affected 8 times and the mother 10 times, 26 of the 56 children being affected—46 per cent. Indirect heredity was present in 3 families, all of the 11 children being affected—100 per cent. Nine families showed collateral heredity, 29 of the 40 children being affected—70 per cent.

XI. OPHTHALMOPLEGIA AND PTOSIS.

Under this head cases of strabismus are included. There have been 31 families reported showing direct heredity, 24 fathers and 7 mothers being affected; 74 of the 112 children were affected—66 per cent. To these must be added the case reported by the author, making 32 families; 24 fathers and 8 mothers affected;

121 children; 77 affected—63.6 per cent. Both parents were affected in one case, and of their 6 children 3 were affected—50 per cent. One family showed 100 per cent. of indirect heredity, the only child being affected. Four families showed collateral heredity, 11 of the 15 children being affected—73½ per cent. To these must be added the case reported by the author, making 5 families; 17 children; 13 affected—76 per cent.

XII. RETINITIS PIGMENTOSA.

There were 118 families of retinitis pigmentosa reported as showing direct heredity. The father was affected 56 and the mother 62 times. Exactly one-half of the 382 children were affected—50 per cent. To these must be added the cases reported by Drs. Alleman and Ewing, making 126 families; 61 fathers and 65 mothers affected; 405 children; 205 affected—50.6 per cent. Two cases are reported where both parents were affected, 5 of their 10 children being also affected—50 per cent. Twenty-five families of indirect heredity had 52 out of 71 children affected—73 per cent. In 132 families containing 535 children, 343 showed collateral heredity—64 per cent. To these must be added the cases reported by Drs. Ryerson and Wood, making 133 families; 541 children; 349 affected—64.5 per cent.

Here again the fact of both parents being affected has not raised the percentage of direct heredity. The greater danger of collateral heredity is shown by the larger number of cases and the higher percentage.

XIII. GENERAL DISEASES.

It would be impossible to discuss thoroughly, in a few words, the information grouped under the head of general diseases. The cases range from hereditary influences of acquired lesions of the eye to that of sarcomata; from the amaurosis of pre-ophthalmic times to color blindness. There are numerous cases of dissimilar heredity, and these do not include the cases of deaf-mutism, idiocy, etc., which might have been included. Though they possess no statistical value for the purposes of this paper, they are strongly confirmatory of the danger to children from hereditary blindness. Under this head come properly the numerous cases reported in the letters from the different institutions for the blind, showing strong hereditary tendencies, though, unfortunately, for the most part, lacking statistical value.

GENERAL REMARKS.

If the results of the investigation are assembled in tabular form several interesting facts become at once visible:

Collateral Heredity.	Affected children. Cormal children. I'er cent. affected children.	21 22	23 8 74.2	43 13 77	163 68 70	193 119 61.8	40 5 88.8	34 16 68	33 20 62	20 7 74	29 11 70	13 4 76	349 192 64.5	
	Total children,	43	31	56	231	312	45	20	53	27	40	17	541	-
Families.		00	0	19	61	68	18	13	13	2	0	70	133	
Indirect Heredity.	Per cent. affected children,	0	66.6	100	09	42	20	100	40	0	100	100	73	
	Normal children.	0	4	0	65	62	9	0	9	0	0	0	119	
	Affected children,	0	90	4	93	45	9	C.S	4	0	11	=	22	
	Total children,	0	12	4	155	107	12	2	10	0	111	1	7.1	-
Families.		0	41	60	43	29	ಣ	H	1	0	60	-	25	
Direct Heredity. One parent affected.	Per cent. affected children,	12	74	70	46.6	80	70	42	55	100	46	63.6	50.6	
	Normal children,	15	40	17	64	423	46	36	50	0	30	44	200	
	Affected children,	22	116	40	56	589	109	26	72	7	26	22	202	
	Total children.	17	156	22	120	1,012	155	62	131	=	26	121	405	
	Affected mothers.	3	30	15	18	152	24	00	21	Н	10	00	65	
	Affected fathers.		29	11	28	145	19	10	23	0	00	24	61	
	Families.		59	26	46	304	43	1.8	44	Ħ	18	32	126	
edity.	Per cent. affected children.	:	:	:	:	09	:	:	:	:	:	20	20	
Direct Heredity th parents affect	Normal children.	:	:	:	:	9	:	:	:	:	:	ಣ	10	
rect Her parents	Affected children.	:	:	:	:	6	•	:	:	:	:	ಣ	10	
Dire th ps	Total children.	:	:	:	:	15	:	:	:	:	:	9	10	
Both	Families.	:	:	:	e epod	ಣ	:	:	:	:	:	H	23	
	Diseases.	Albinism	boma fridis	microphthalmus	Atrophia nervi optici	Cataract	Ectopia lentis		Glaucoma	Megalophthalmus	Nystagmus	and ptosis		
		II.			IV.	Α.	VI.		VIII.	IX.	N.Y	XII		

In the first place, the average percentage of affected children in all diseases taken together is 54.8 per cent. when both parents are affected, and 57.5 per cent. when only one is affected. This can not be taken as proof that the latter is more dangerous than the former, as there are too few cases of the former for a hard and fast percentage. But it does show that there is as much reason to object to the marriage of one blind person as when both are blind

The percentage of indirect heredity is somewhat higher than that of direct, while that of collateral is the highest of all. This shows, at the very least, the danger that a latent taint may at any time break forth and affect the children of apparently healthy parents who come from affected families.

Although some diseases seem to manifest a partiality for transmission through the father and others through the mother, the total number of those affected was 360 fathers and 335 mothers, with 7 unknown, or almost the same. When any disease shows a preponderance of affected parent of either sex it is, in my opinion, merely due to the fact that more of that sex happened to marry and have children. On the other hand, it is undoubtedly true that most cases of indirect heredity of optic nerve atrophy occur through the mother.

Attempts to better the condition of mankind have almost always been met by the opposition of those to be benefited. Vaccination has its opponents even to-day. Every physician who has been in general practice knows how difficult it is to enforce the laws requiring the report of infectious diseases. Nowhere was this more strikingly shown than in the recent vellow-fever epidemic in the south. We are at present passing through an antivivisection craze, though it is unnecessary to state how much vivisection and animal experimentation have done for mankind. And it is rather amusing to note the difference with which the physical betterment of the lower animals and of man is regarded. For the careful stockman will breed the best stock of cattle that he can obtain; the dog fancier will choose the hound or setter or pointer with the best pedigree; the horseman will select the colt of the horse that has clipped off a few seconds from the world's record, and so it goes. Only in the case of man the belief seems to obtain that there is a grand dispensation of Nature, by virtue of which he may violate her laws with impunity. He may not steal the property of another, but he may steal from himself the time necessary for rest and recreation. He may not kill his fellow-man, but he may drink himself to death if he so desires. Any attempt to bring about a better hygienic or physiologic condition is met with the cry of "interference with the rights of man."

If, therefore, the proposition to prevent people suffering with hereditary blindness from marrying is met by the same cry, it is no more than was to be expected. Only it is a rather unfortunate argument, inasmuch as a review of history will show that regulation of marriage has always been a function of the church in the past and of the state in the present, and the tendency has been toward restriction rather than relaxation. From polygamy we have come to monogamy. From the Ptolemy Pharaohs of Egypt who married their sisters, we have come to the law forbidding relatives as near as first cousins from marrying. Every regulation has passed through three stages: first, active opposition; second, passive obedience; third, axiomatic acceptance, and the proposition to prevent the blind from marrying is at present passing through the first stage. The state undoubtedly has the right to enforce such a regulation, if it is shown to be for its best interest, and surely it is for its best interest to prevent the birth of individuals handicapped from the start by the inheritance of ocular defects.

There is one more argument or, rather, plea which must be answered, viz.: that the lives of these unfortunate men and women be not made still darker by depriving them of the jovs and companionship of married life. Yes, but what of the children? What of their sufferings and sorrow? Will it make the darkness of their lives any brighter because their parents have been happy? If a man had ten children and should blind seven of them, what extenuation would the fact of his desire for happiness have? Yet that is exactly the risk that any man with anophthalmus takes when he marries, that 70 per cent. of his children will also have anophthalmus or microphthalmus. Is his happiness a sufficient compensation for their misery? Have you more sympathy for the man for his few moments of grief than for their long years of sorrow? The normal child of normal parents has a hard enough time of it in this world. Do you think that the struggle of life will be any easier for the blind child of blind parents? Let us face the situation squarely: if the marriage of the blind is advocated it must be done with the full knowledge of the danger to the offspring, which can be prevented only by an interference with the normal processes of Nature, which no physician will advocate.

It may be that in the course of time the advance of our science will bring us to a thorough understanding of the genetic principles of life and thus provide a method of nullifying the adverse forces of heredity. When that time comes all restrictions may be laid aside, but until then it is the part of prudence and even of philanthropy to prevent the marriage of those affected with the forms of blindness enumerated above.

WHAT IS THE BEST METHOD OF PREVENTING HEREDITARY BLINDNESS?

We have now come to the second question which was to be solved, viz.: what is the best method of preventing hereditary blindness? As already indicated, it is by preventing the marriage of persons affected with these forms of blindness, and thus checking them in their incipiency. This will not cause these forms of blindness to disappear, for they will continue to originate de novo, but it will cut short the tainted line of heredity. As to the best method of carrying out this solution, the following recommendations are offered:

- 1. All those whose life work brings them into relationship with the blind should be made acquainted with, if they are not already aware of, the dangers which are connected with the marriage of a blind person, whether to one of normal sight or to another blind person. As a corollary to this, I would suggest that this society put itself on record in some formal manner as to its position upon this question.
- 2. The blind themselves should be warned of the danger to their children in case of marriage, and should be strongly advised to remain single.
- 3. A distinction must be made between hereditary and non-hereditary forms of blindness. In the former the chance of the child inheriting the parent's disease is too great to allow any option. In the latter, social and economic considerations enter with which the present paper can not concern itself.
- 4. In addition to mere precept, legal assistance should be invoked to prevent blind people from marrying. This, in my opinion, could be most practically carried out by the license clerk inquiring if either of the parties had any disease of the eyes. In case of an affirmative answer, the certificate of a reputable oculist should be required, stating that the disease is non-inheritable. If a negative answer is returned, both parties should be required to write their names, as most of the sufferers from hereditary eye affections have lost their vision to such an extent as to make this difficult. If the clerk suspects from any reason that one or both of the parties are affected, he shall refuse the license until a proper certificate is

- obtained. This is analogous to the right of a clerk to refuse a license to those whom he believes to be under age, in spite of their positive declaration to the contrary. That there are objections to this method of solving the difficulty is not denied, but it seems the most practical.
- 5. This law is to apply only to those cases of blindness where heredity has been proved. With the exception of glaucoma and cataract, these diseases usually manifest themselves at or before the marrying age. In the two exceptions noted, unless they are anticipating or congenital, the marriage frequently has been consummated before the disease appears in the parent. Consequently, the offspring of such marriages may be totally ignorant at the time of their own marriage of their own danger and that of their children. It would be better for no descendant of a cataractous or glaucomatous ancestor to marry, but it will be found impossible to prevent those from marrying who do not show the taint at the time of marrying, because they will deny the presence of the disease in their ancestors.
- 6. It would be inadvisable to pass a law compelling every person to have an oculist's certificate before being allowed to marry, although such a law would be the ideal condition. In the first place, it would work a great hardship in those localities where there is no competent oculist. In the second place, the ratio of blind persons of all kinds to those of normal sight is comparatively small, according to the Swiss census of 1895-96, as reported by Paly, being between 7 and 8 in every 10,000. The percentage of those who are blind from hereditary blindness is between 5 per cent. and 10 per cent. of the total number of blind persons, so that less than 1 in every 10,000 persons in any country would be affected by the law proposed. It would be impossible to enforce such a law upon 9,999 persons in order to compel its observance in 1 person, and the discretionary power in the hands of the license clerk would serve for the present.
- 7. Finally, there is the important duty of educating the general public in the dangers arising from hereditary blindness. They should be told that even though they may be normal themselves, if two of their children are blind, there is great danger to subsequent ones, and that large families in such cases should be avoided. Furthermore, they should be advised to prevent as far as possible the marriage of their children into families tainted with hereditary blindness. They should be warned that sisters of men suffering with hereditary optic nerve atrophy, although they may be normal

themselves, are very liable to transmit the disease to their children, and should advise their sons to seek wives elsewhere. And finally, they should be told that the misfortunes of the fathers are sometimes visited upon the children of the third and fourth generation, and that though the ones who desire to marry into their families may have normal eyes and their parents may have normal eyes, if any ancestor has had a hereditary eye disease there is a latent taint that may appear at any time. Therefore, it is their duty as parents, who desire the welfare of their children, to investigate not only the moral and financial status of the one who is to enter into their family circle, but the physical status as well, and to refuse consent where hereditary eye disease exists.

DISCUSSION.

Dr. F. PARK LEWIS: -- I want to say a word as to the practical application of this paper. At the state school for the blind at Batavia there are 150 pupils. Of that number there are five that are the offspring of parents both of whom are congenitally blind. The study of this question has led the management to exercise extraordinary measures in keeping the sexes separate. Three of the children blind in the school are the progeny of the marriage of pupils, and it is therefore considered important that they should not even get acquainted with each other in their various social affairs. It has been the custom of the authorities of the school to have the boys gather in their own department for their social affairs, and the girls in theirs. When one considers the horrible possibilities of these marriages the care taken is warranted. I can not accept the conclusion that the blindness is not dependent on both parents being blind. The children are very apt to follow one strain or the other; there are two chances of the child following a bad strain when both parents are congenitally blind to one when the defect is found in but one. It is a study worthy of great consideration, and those who have connection with the young blind will do well to recognize the fact that congenital blindness is very prone to continue through the generations.

Dr. Howe:—I would also say a word of appreciation of the importance of the subject. Our effort is not simply to cure, but to perform the still greater function of preventing. This question is a very large one, and I hope this is not the last communication we will have on that subject. Before long we may be able to give some opinion which is of real importance to the community.

Dr. STUEBER:—We frequently hear the expression that "prevention is better than cure." It has been said that if we wish to guard against defects of mind and body it is well to begin a hundred years before the birth of the individual, and that may apply in the subject under consideration. Heredity probably explains many cases, though some cases we can not explain in this way. I wish to refer to three cases under my observation.

Several years ago I saw three cases of congenital blindness all in the same family in which there had been no heredity, no consanguinity, no specific disease or anything else to account for it. The mother, however, stated that several months prior to her first confinement, while in a store shopping, she was accosted by a blind man, whose sudden approach so impressed and shocked her she was not able to forget the interview. After her confinement she was told of the child's defective eyes, which did not surprise her in the

least. She rather expected it. In the second child there was the same condition and an explanation like the first. She says that on one occasion during her pregnancy the first born fell out of a second story window, giving her a fright. The third child was not blind; however, she had a fourth born blind.

It occurred to me that the profound impression registered by the nervous system might explain the third case of congenital blindness. She had seven children, the first, second and fourth blind, the others normal. The children are fairly well developed, though some have rheumatism.

DR. Young:—For the advancement of science this paper is valuable, but I do not see how anything is going to come of it in a free country where we have no restrictive laws. Even in Europe, where there is restriction, they can do nothing of moment. We can do nothing but point out the way, and then people will marry and marry whom they choose; or beget children out of wedlock, as they do in Europe where they have restrictions.

Dr. Connor:—In Indiana they have a law by which no marriage license can be issued except the individuals appear before the county clerk and swear that they have not had syphilis or gonorrhea or have none at the time, and if it appear afterwards that they swore falsely then the marriage is void and they are punished. If this be true of Indiana with reference to this thing I do not see why it is not easy to add this other element to it, so they cannot get a license.

Dr. Alt:—It seems to me that no such law would reach the children born out of wedlock. What remedy is there for them? I only see one remedy, that another be asked for ordering the boards of health to asex all blind born children. We have a law in Missouri which prohibits the marriage between whites and blacks, but it does not prohibit the creation of children with mixed blood, as you all know.

Dr. Loeb (closing):—I am sorry I did not get to finish my paper, as the list of figures I was able to collect is interesting. Dr. Lewis will find that the percentage where both parents are blind is practically the same as where only one is blind. I am not advocating the marriage of two blind people as against one, but I am against both.

The three children Dr. Stueber refers to are probably instances of collateral inheritance. What the original source of the taint was I can not say

It is possible to pass such laws. In our state of Missouri we do not allow the marriage of first cousins. The statement Dr. Connor makes about Indiana is just in accord with the plan I suggest, that a license be refused to anybody who is the victim of hereditary blindness. They must have a certificate from an oculist that the blindness is not of a hereditary nature. I think it will pay you to read the letters I have received and also the cases which I have been able to collect. I also suggest that this academy take some stand on allowing people who are blind to marry.

Dr. Vail:—There is a motion contained in the doctor's paper that it is the sense of this society that definite legislation should be fostered in our several states with a view to preventing the marriage of persons blind, whether both contracting parties are entirely blind or one alone is entirely blind.

FURTHER EXPERIENCE WITH THE SMITH-INDIAN OPERATION IN THE EXTRACTION OF FIFTEEN CATARACTS.

D. W. GREENE, M.D. DAYTON, OHIO.

The recent visit of Major Smith to this country, his address before the American Ophthalmological Society at New London, Conn., on "The Operative Treatment of Immature Cataract," the operative clinics which he held in New York, which it was my privilege to attend, and the article in Archives of Ophthalmology, January, 1908, by Dr. Arnold Knapp, describing what he saw at Jallundur, India, and the very brief description of the 100 extractions, many of which he made, have all served to draw attention to this operation. In addition, reports of the small number of operations made in this country have appeared from time to time, so that it has perhaps received more thought and attention than any other operation for cataract since the time of von Graefe.

From the beginning, the desire of the profession has been for a reasonably safe manipulation in the extraction operation which would remove the capsule with the lens. All have recognized the undesirability of leaving it behind and the surgical incompleteness of all operations which do so. Witness the early efforts of Richter and Beer, the later efforts of Sperino and de Wecker, and the still later method of Pagenstecher and McNammara to accomplish this end. All of these methods came to naught, because they added to the usual steps the passing into the vitreous of a scoop or vectis to deliver the lens by traction usually with rupture of the capsule, being such violence few eyes could withstand, and the method never gained in professional favor. In the Indian Medical Gazette, of Calcutta, July, 1900, there appeared an article by Capt. Henry Smith, I.M.S., a civil surgeon at Jullundur, Punjab, North India, in which he advised a return to the method of extracting the lens in the capsule, but by external manipulation. He submitted the facts and statistics to support his contention that it was a more perfect surgical procedure and gave better visual results than the orthodox operations which open the capsule and leave it behind, often with cortical débris, which, in a way not well understood, often causes intraocular inflammation. And, in the same journal

of June, 1901, another article appeared giving his further experience with the method. These journals are only referred to because they are not accessible to many students and one should know where to find the material for the study of the method from its inception in order to reach proper conclusions regarding it, and know the different steps in the evolution of the operation.

It is a matter of historical interest that Major Smith should have extracted over 20,000 cataracts in 18 years, 17,000 of them within the capsule, 5,000 without iridectomy and the balance with iridectomy. But, of greater interest to us is the fact that with his matured judgment and ripened experience as an operator, he should to-day be the warmest advocate and steadfast friend of extraction within the capsule; and, stranger than all, is the fact that with all this admitted and with the unequal statistics which he has offered in support of the superiority of the operation, he has comparatively few followers. Why this is so, I am not certain, but rather think that men refrain from doing the operation because of its apparent formidableness, danger of loss of vitreous, the difficult technical details of its execution, the general idea abroad that vision is not better, and the risk greater than after the regular operation, and with private patients greater responsibility exists. This deters many from performing the operation. There is no good reason why vision should not be better and remain better, and Smith asserts that it is both. There is no reason, as I see it, why the risk of the operation should be greater than after orthodox methods.

It is unfortunate that with Major Smith's statistics he is not now able to give us exact information concerning the evil which may come remotely to an eye from which vitreous has been lost, and tags of iris or a thread of capsule have become entangled in the wound. These accidents are looked upon in this country with great apprehension, and the whole future of the method depends upon the rôle they are shown to play. Major Smith's ipsi dixit statement that loss of vitreous seldom does harm, is probably true in his experience, as the loss is usually small in his skillful hands, and only occurs in 8 per cent. of his operations; and, the average Indian being of a low order of civilization, the catabolic changes in his tissue from a simple vegetable diet do not conduce to inflammatory The fact should be remembered that many of these patients have to come hundreds of miles to be operated on, their stay is short at the hospital, and they are usually lost to him after their return home, and he can not often know what ultimately happens

to their eyes. The additional fact that few can read makes the testing of vision difficult even with the devices he has constructed for that purpose. It is a matter of great satisfaction to be able to state, however, that all cases having had vitreous loss, etcetera, which can be gathered together are to be re-examined by Major Smith and his assistants with the aid of Dr. Jamison, who goes to India as a representative of the Moorfields for this express purpose this fall. Smith contends that the vitreous is reproduced when lost, and asks why it should not be. In his experience a loss of vitreous equal to one-third its volume does no harm. This is a question for the pathologist to determine. We shall soon know the exact truth on this point and no one seems more desirous than Major Smith that the truth, the whole truth and nothing but the truth, shall go out from his clinics.

I know of no accidents or complications of the Smith operation that are not inherent in all regular or orthodox operations, and it has some advantages over them. If a cataract is over ripe, the cortex milky and nucleus small, the zonula weak, or the vitreous fluid, it is easy to lose vitreous by any method and to have iris prolapse. Smith does not attempt to extract all cataracts in the capsule. Perhaps there is 25 per cent. more risk of loss by the Smith method for the novice; but, one of Smith's contentions is that the amount of vitreous lost is small, as a rule, when compared to that lost in the regular methods of the delivery of the lens. The elimination of the capsule is quite an additional advantage; and, for the extraction of immature cataract, the method is superior to any process of artificial ripening and extraction afterward. For quick delivery of the lens in such emergencies, Major Smith has devised an instrument similar to the Daviel spoon, but has made it flatter and more curved. Perhaps a flat spud would convey a better idea of its shape, the spud portion being 8 mm. wide and 12 mm. long at one end. With his approval I have modified it so that the other end is 4 mm. wide by 12 mm. long. He has shown and described how to hold it in the left hand, and use it as an aid in the expression of the lens; and, if loss of vitreous occurs, to pass it well back of the lens, to support it, using the spoon as an incline plane up which the lens will glide to its exit by the pressure of the strabismus hook on the cornea below. Of course there is no reason why this should not be used when vitreous is being lost in any operation; and any one who will try it, will recognize its superiority over scoops, double hook, etcetera, because the lens can thus be delivered in the copsule. If Major Smith has done nothing more

for the cataract operation than to show how to deliver the lens quickly with this instrument, and with small vitreous loss, he should have the credit, which, so far as I know, belongs to him alone. But there is much more to his credit. So far as I can learn, the idea of delivering the lens by external manipulation, no instrument except the knife entering the eye, the purpose being to deliver the lens in the capsule, by expression, not by traction, should also be credited to him. It must be granted that after all these years there are still inherent defects in all orthodox methods of extracting which so far have not been overcome.

We come now to consider what Smith regards as the lesser of two evils in extraction, possible vitreous loss, entanglement of iris, and tags of capsule in the wound, on the one hand, and the greater evil, that of leaving behind the capsular bag itself with cortical débris to form an after cataract, which will require one or more knife-needle or scissor operations with possible infection glaucoma and the evils named above in addition. I do not recall any essential improvements in the steps of the cataract operation from the time of von Graefe until now, unless the Smith operation proves to be an improvement. No one by simply looking on at an operation at a distance of several feet can judge whether it is or is not an improvement on older methods. Theoretical considerations do not apply, and no one is capable of judging whether the operation is or is not an improvement, unless he has made it several times himself, and has watched the cases for some time. Because some of the steps of the operation are radical departures from old methods. it does not signify that they are rough or unscientific. Smith repeatedly demonstrated on the palm of the hand that the pressure used to express the lens was not such as an on-looker would estimate it to be. In fact, the thought of excessive pressure being used refutes itself. But, he insists that the eye must look straight forward, that the pressure must be in the half circle around the lower third of the cornea, and be backward, steady, uninterrupted and varied to the changing position of the lens during its exit.

I have in Ophthalmology, January, 1907, recorded my experience with 22 cases of extraction within the capsule which were not favorable to the operation as a whole, others having a like experience. Recently, I saw Major Smith make three extractions in New York, and spent several hours with him, listening to detailed descriptions of his method. Speaking for myself alone, I now know, after recent experience gained in the fifteen operations, that my so-called Smith operation of two years ago was not a properly made

Smith operation. In the first series, I only succeeded in delivering 50 per cent. of lens in the capsule and in this latter series over 80 per cent.

In the last fifteen cases, the capsule ruptured once from the prick of the knife in making the section; insignificant loss of vitreous occurred three times. No case of glaucoma has so far developed and no well marked case of iritis has been noted. I think there can be no doubt that fewer cases of iritis will be met with when the capsule is not ruptured.

From the criticisms one hears of the Smith operation, we are led to ask ourselves what good ground is there for such criticism? Have we attained to such a degree of perfection in the regular operation that no further improvement can be made? Or are we at the parting of the ways, and must either go forward or stand still? If the orthodox operation is not entirely satisfactory as to visual results because of capsular remains and corticle débris, inflammatory reaction and the treatment of the after cataract, theoretically the Smith operation should be satisfactory, as it eliminates all of the causes of poor vision and the after-treatment, other things being equal. Practically, it is open to the objection that it is a more difficult operation to perform, that more delicate and sometimes prolonged manipulation is required to deliver the lens; this favors the development of striped or lattice keratitis. But I have been surprised and gratified several times at the clear black pupil and the slight reaction in the cornea which has followed prolonged effort at delivery. In only one case of prolonged effort at expulsion of the lens has lattice keratitis remained and reduced vision to 4/200, which is gradually clearing up under prolonged use of dionin applied in powdered form; in one other case I have seen a faint striated opacity running downward and backward through the vitreous sufficient to reduce vision from 20/30 to 20/50 in two weeks; no vitreous was lost at the time of operation, but a considerable ill-defined reaction had followed the operations with prolonged healing and plus tension, which yielded to paracentesis and eserin.

Striped keratitis I have seen in two cases, probably from too small a section and the unusual manipulation required to deliver the lens, but they have cleared up. Having said this much in favor of the operation, and having admitted its strong and weak points, and being impressed with the correctness of the principles which underly it, as I understand them, and comparing them with the orthodox operation, I am favorably impressed with it, and

shall continue to practice it in all suitable cases. I believe it has a great future, perhaps not for every operator, but in the hands of the few who learn to do it well. Still, having said this much, I do not wish to appear as a champion of the Smith operation until I have seen more of the reactions and final results from it among the white people living under different climatic, dietetic conditions and under a higher civilization than the people of India. The question of the relative safety of the operation must remain subjudice.

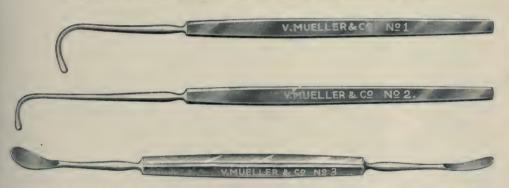
I expect to sail for India December 22, 1908, and to spend about two months in Major Smith's clinic. He has offered me every inducement to visit him in Jullundur, and the privilege of learning the operation under his direction. Since this paper was written I have made more than fifteen additional extractions, but the time has been too short to present them with carefully prepared statistics.

EXHIBITION OF INSTRUMENTS.

MODIFICATION OF MAJOR SMITH'S INSTRUMENTS FOR EXTRACTING THE LENS WITHIN THE CAPSULE.

D. W. GREENE, M.D. DAYTON, OHIO.

Major Smith's set of instruments for extracting the lens within the capsule had flat handles like an ordinary surgeon's scalpel, which were rather awkward to handle for a man who is used to the eye instruments we employ in this country, therefore, I changed the handles from the flat heavy brass handles to the four-sided light aluminum handles we are used to and which allows of a more



delicate touch. I also found that hook No. 1 was too long and would not allow the assistant to rest his fingers on the rim of the orbit to help control the action of the orbicularis, therefore I had same shortened three-fourths of an inch. The double spud No. 3 of the original set was the same size at each end, so I had one end made 4 mm. and left the other 8 mm., as in his original set, and find them satisfactory in their present sizes and curves.

The illustrations are about three-fourths the actual size of the instruments.

The larger hook (No. 1) is to be hooked under the upper lid, held by an assistant with the thumb and index finger of either hand; the other three fingers rest on the brow at the margin of the orbit; by elevating the lid with the hook and with pressure from the fingers on the orbital margin the orbicularis is under control, and there is little danger of vitreous loss with a skilled assistant, provided the eye is directed straight upward and the patient on the back.

No. 2 (the smaller hook) is used to break the attachment of the zonula to the lens, in the lower half of the circumference of the cornea, the incision involving about the upper half, by pressure straight backward, steady, uniform and uninterrupted, 1 to 2 mm. from the corneal margin, with the blunt tip of the hook. The amount of the pressure can not be gauged in words, it can only be acquired by practice, but must never be excessive.

The attachment of the zonula having been broken so that with the hook the lower half of the lens can be mapped out through the cornea and iris, the small end (4 mm. wide) of the double spud, called No. 3, is pressed on the sclera below, edgewise, 1 to 2 mm. behind the sclero-corneal margin; immediately the wound will gape in proportion to the pressure used and the lens will advance toward the incision, holding what is gained in the advance of the lens with No. 3. The hook No. 2 is to be used to follow up the lens with pressure directly backward just in advance of the spud, until its exit from the eyeball.

IRIS FORCEPS.

LEE MASTEN FRANCIS, M.D. BUFFALO, N. Y.

This iris forceps commends itself on account of the following details: 1. While sufficiently strong to be stable, its size and light weight make manipulation easy as compared to larger and less delicate instruments. 2. The teeth are placed in the rear and are



ground down so that when the blades are closed no uneven surface is presented to engage in the wound or prematurely entangle the iris. 3. A firm and steady hold is permitted because of the wide grasp for thumb and finger. 4. The blades open very readily, so

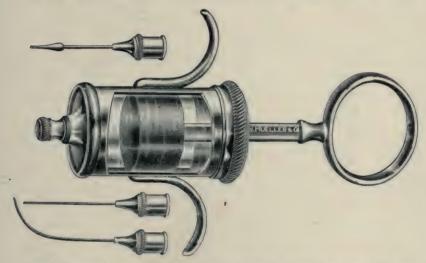
that control is easy. 5. The instrument may easily be taken apart for cleansing. 6. Because of the crossed blades the forceps may be introduced through a very small wound.

The instrument may be obtained from F. A. Hardy & Co., or Mueller Bros., Chicago.

NEW INSTRUMENTS.

MARK D. STEVENSON, M.D. AKRON, OHIO.

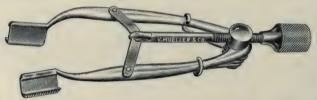
1. An Improved Lachrymal Syringe.—It is quite short, $2\frac{1}{2}$ inches when closed, $3\frac{1}{2}$ inches when opened. It is, therefore, so short that the hand operating it can be rested on the other hand lying on the patient's face. This steadies the operator's hand. His



hand, the syringe and the patient's face all move as one unit, any movement of the one being communicated to the other. It is provided with three tips, one straight and one curved gold, and one special short tip, 1 inch long, with nozzle swelled some distance from end so as to stop up completely canaliculus being syringed, thus preventing regurgitation from it. This latter kind of nozzle was first described by W. Gordon Byers (Ophthalmoscope, April, 1906). Capacity, nearly 2 drams. Good supports are provided for the fingers and thumb. It is provided with a boilable asbestos piston glass cylinder, and can be readily sterilized. It is easily

manipulated. Such a syringe can be kept in best condition by being filled constantly with a mild antiseptic solution. It is assembled in a neat case. Made by V. Mueller & Co., Chicago, Ill.

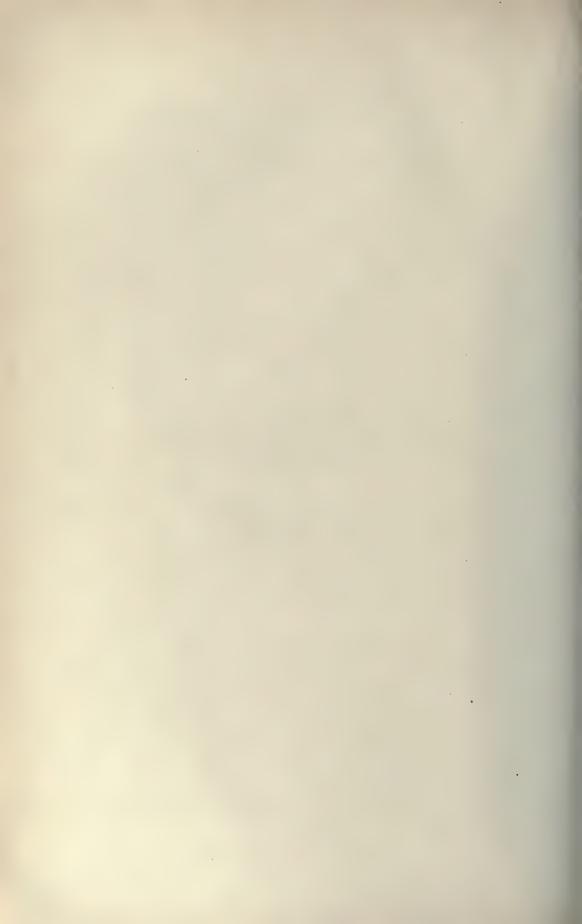
2. A Lachrymal Sac Speculum which can be used in any small wound, e. g., in exploring the orbit for orbital cellulitis due to ethmoiditis, in removing the lachrymal gland, opening the frontal sinus, etc. The body of the instrument is similar to Todd's tendon tucker, light, but strong, not heavy and clumsy like the German instruments. The first model had three teeth on each blade with which to catch the tissues. Many operators like this form. The second model has no teeth, which are replaced by two vertical plates with a lateral serrated edge to hold the tissues. These plates have a smooth lower margin, which, pressed against the bone by an assistant, reduces the bleeding from the vessels lying close to the bone, and which can not be compressed by the stretching of the tissues due merely to the opening of the instrument. The pressure can not be regulated by instruments which are opened by a spring, as



in the German instruments, and if one side of one of these instruments should slip from the wound it would probably lacerate the cornea (Meller). This is impossible with my instrument. Only one instrument is required, but I have sometimes used two. The second with slightly deeper blades is employed to pull open the ends of the wound exposing a quadrilateral field for operation. A beginner usually makes long incisions; as they become shorter the ends of the blades can easily be filed away, making the blades shorter.

- 3. An Evisceration Spoon, elliptical in shape, smooth on one edge and serrated on the other. It is everything required to scoop out, scrape out and freshen the interior of the sclera.
- 4. A Sharp Knife.—Used where sharpness is required in order to produce as little pain as possible. It is made on the same principle as the Hagedorn needle. The slanting edge is sharpened first and then the knife is drawn on its back a few times across a fine stone. This makes the point very sharp. It is useful as a paracentesis knife and to make any small incision in the lids. It can be thrust directly into a hordeolum with little pain.

- 5. A Wide Curved Knife Depressor.—The tongue is pressed to the side of the mouth by the fore and aft concave part of the instrument. It is not possible for the tongue to get over or under the curved sides of the depressor. If desired the tongue can also be pulled forward, lifting the epiglottis. The handle is strong and so made that the operator can easily press downward or sideways.
- 6. A Tonsil Knife.—It is difficult to keep a curved knife sharp. I found that Dr. A. H. Andrews' sphenoid knives were useful in removing tonsils, so I constructed a similar tonsil knife with straight blade. After using it to separate the pillars, two cuts outward, one from above, the other from below, is usually all that is required to remove the tonsils thoroughly.
- 7. Three Pairs of Tonsil Scissors.—One pair chiefly used is short, strong and only slightly curved. It is worked through the side of the mouth opposite the tonsil being removed. Another pair strongly curved is sometimes useful in cutting the lower part of the tonsil upward. A third pair with blades at an angle of about 60 degrees from the plane of the handle (not on the flat) is often very useful. e. g., to remove the lower part of tonsil from above and to separate the pillars. Each blade can fit snugly against the base of the tonsil. Seissors properly used cause less pain under local anesthesia than knives.



TRANSACTIONS

of the

THIRTEENTH ANNUAL MEETING

of the

American Academy of Ophthalmology and Oto-Laryngology

OTO-LARYNGOLOGICAL DIVISION

HELD AT
CLEVELAND, OHIO,
AUGUST 27, 28, 29, 1908.



POSTGRADUATE INSTRUCTION FOR SPECIALISTS.

GEORGE E. SHAMBAUGH, M.D. CHICAGO.

A frank discussion of the conditions which confront us to-day will help in an intelligent understanding of the problems for the future to solve in the task of preparing men for practice in the special fields. A recognition of our own shortcomings is often the best means of ascertaining where the future will inevitably improve upon present-day conditions.

Too much emphasis can not be laid upon the fact that many of the great achievements of modern medicine are the direct result of the tendency toward specialization. A more or less general recognition of this fact has created in all parts of our country a demand for the trained specialist. This demand has its parallel in that demand for the trained physician, which existed a half century ago as the result of the rapid development of our frontier. The latter resulted in the establishing of a larger number of proprietary medical schools, which for a time served a useful purpose, but which are now for the most part a serious obstacle in the way of the higher development of medical education.

The history of the preparation of the specialist is in a large measure parallel to that of the training of the general physician. To meet the increasing demand for trained specialists there sprang up in our larger centers of population the so-called postgraduate medical schools. These schools extended practically the only opportunity for training in the specialties, and the result has been that they were crowded with physicians from all parts of the country, seeking the necessary preparation to practice in special fields. These postgraduate medical schools have filled a useful place, but, like the proprietary medical schools, their period of usefulness has largely disappeared. Specialization of to-day has outgrown the postgraduate medical school fully as much as general medical education has outgrown the old type proprietary medical school.

The time was, in the earlier days of specialization, before much had been accomplished in the development of the special fields, when it was customary for the general practitioner without any special preparation to limit his work to this or that specialty, and from that time he was recognized as a specialist. It was under these conditions that the postgraduate school accomplished its best work. These men would get away from their work for a few weeks, and at the postgraduate school they would acquaint themselves with the use of the instruments necessary for the examination of their cases, and returning to their practices they gradually developed, if they were studious and persistent, as the specialty itself developed and expanded.

That conditions to-day have changed everyone recognizes. How great the change has been comparatively few seem to realize. There still exists in the minds of many only a half appreciation of what specialization really implies. It does not seem to be generally recognized that the development of the specialties has in recent years carried the work in these fields so far beyond the scope of the work done by the general practitioner, or the general surgeon, as to require at least several years of close painstaking study in order to give one a preparation adequate to take up the real work of the specialist. It is still not uncommon to-day to see the general practitioner drop his general work, for which his medical course has prepared him, and limit his practice to this or that special field, with no further preparation than a few weeks' attendance in a postgraduate school, or a few months' trip abroad.

Another example of this lack of appreciation of what is actually being done in the special fields is the spectacle which we still sometimes see, of the general surgeon undertaking to operate on the mastoid for the relief of complications arising in the course of chronic suppurative otitis media, when he might just as logically assume to do the dental work for his patient. The one is as remote from his regular line of work as is the other, and in attempting to operate on the mastoid he is subjecting his patient to the unwarranted risks necessarily associated with surgical work about the ear when undertaken by any one who has not given to the anatomy of this region the careful detail study which only the well trained specialist has done.

These evils are, in part at least, only to be expected as necessary to a new order of affairs, such as the rapid development of the specialties has brought about. Yet the blame for the present-day conditions, where we see so many men who have had no adequate training limiting their practice to special fields, is in a large measure with ourselves. We still lend encouragement to the idea that a practitioner can become a specialist over night by permitting our postgraduate school to issue at the end of a few weeks' at-

tendance a certificate which is intended for and is actually used to lead the patient into believing that the physician has actually had the training necessary to prepare him to do the work of the specialist. As a matter of fact, he is often scarcely prepared to do the work which any well-trained general practitioner can do, while all the conditions which call for expert special care are entirely beyond his scope.

Just as the multiplication of proprietary medical schools has led to the turning out of physicians far in excess of the actual demand, so in recent years the tendency to specialization has been greatly This is particularly true in the field of the eye, ear, nose and throat. There is scarcely to be found throughout the country a town where there are not one or two physicians limiting their practice to these special fields. An inquiry will frequently elicit the fact that it is often the unsuccessful practitioner who has thus sought to better his condition by limiting his work to a specialty; just the type of men who by Nature are least fitted for the more difficult and more exacting work of the specialist. In the general enthusiasm for specialization such men are often carried along to a spurious financial success, although in many instances they are doing none of the real work of the specialist; in fact, are doing no more for their patients than before they began limiting their practice.

The graduates from all of our better medical schools are to-day receiving enough training in each of the special fields so that they can themselves understand and care for all the simpler conditions which comprise the scope of work which the six weeks' specialists are doing, at the same time they get to see enough of the real special work to appreciate that a general practitioner can not be transformed into a specialist in six weeks or six months, but that at least two or three years' painstaking study is necessary to adequately prepare a physician for such work. Those who are in touch with the advancements that have been made in the special fields are aware that the technical skill required in the examination and the surgical treatment of the diseases of the eye or the ear are as far removed from the work of the general practitioner as is the work of the dentist, and yet a physician who wishes to practice dentistry is required by law to take special training covering three vears.

It is, I believe, apparent that the time is ripe for a revolutionary change in our attitude toward the preparation of the specialist. It should be recognized that one of the most urgent problems in medical education to-day is the establishing of courses of instruction which will provide adequate preparation for the physicians entering the practice of the special fields. It must also be apparent that such courses should be as much in the fundamental sciences as in the clinical study. Thorough training in the special anatomy, the special physiology and the special pathology of the part must be insisted upon. All this work should be put on the basis of real graduate courses, that is, the work should be, as far as possible, exhaustive. In anatomy, for example, not only all the known facts in the anatomy of the part should be brought out, but the work should lead up to a discussion of the unsolved problems in the anatomy of this region. The same should be done for the physiology, the pathology and the embryology of the special field. It is only after fundamental sciences have been mastered that one is properly prepared to take up intelligently the clinical study of the subject. The method still in vogue in our postgraduate schools, of attempting to teach the man preparing for a specialty the clinical aspect of the subject before he has been thoroughly grounded in the fundamental sciences of the subject, is as absurd as it would be to attempt to teach clinical medicine or clinical surgery without first requiring thorough training in general physiology and general anatomy. The ophthalmologist who has mastered the fundamental sciences in his subject stands out to-day distinct from most of the men practicing in this special field. In the future we may expect that it will be required of the ophthalmologist that he understand the fundamental sciences in his subject before he can practice ophthalmology, just as the dentist to-day is required to study the special pathology and the special embryology, etc., of the tooth before he can practice dentistry.

To acquire the knowledge of the special anatomy, the special physiology, pathology and embryology of an organ like the ear, or the eye, which a well-trained otologist or ophthalmologist should have, would require at least one whole year. Another whole year should be the minimum devoted to clinical study before one should be allowed to practice in these specialties.

We have at present no provision for work of this kind. The training afforded in the postgraduate schools in no way covers the field. This work is seldom as thorough as the work in the special fields now being required in our leading undergraduate medical schools. The smattering of clinical instruction to which the postgraduate schools limit their work is of minor importance when compared with the practical benefit to be derived from adequate instruction in the fundamental sciences of the specialties.

In the higher development of our undergraduate medical schools an intimate connection with the universities has been found indispensable. In the same way the development of adequate courses for the preparation of the specialist will be possible only in our great university medical schools with their well-equipped laboratories.

DISCUSSION.

Dr. Beck:—I feel greatly indebted to Dr. Shambaugh for giving us the paper. I was the instigator of the symposium on the method of education in the ear, nose and throat section, as they have in the ophthalmic section. Unfortunately, the other two gentlemen who were to take part in the symposium could not attend, and Dr. Shambaugh was kind enough to give us his paper, in order that we might bring out the points in discussion. I believe that it is as important as any scientific paper that we may read here, first, for the clinical teachers of large cities, and, secondly, for the men who are thinking of study. We see right along the American doctor abroad, and the advantages there are in that method of study and also the disadvantages. I would like to have a full discussion from the members of this Academy, those that teach, their views, what they believe is the right thing, and thus also get the opinions as to how to obtain the best method of instruction. I would ask for a general discussion.

Dr. Holinger:-The points that have been brought out are undoubtedly of wide interest and importance, not only to every one of us at present, but also to the future exponents of our specialties. They will determine whether in the future we will have men that are thoroughly posted and can give satisfaction in every walk of life or whether we will have slip-shod work. Our patients should not be exposed any longer to the possibilities that we have seen them exposed to within the past so and so many years. The endeavor to systematically advance the study of the specialties is a thing which will be well worth our time. This is, however, only one phase of the question. The other phase of the question is the one I have been discussing with Dr. Shambaugh for some time. It concerns us just as well as those who will come after us, and that is this: Let the specialties be for the specialists, and see that the other men, say the surgeons, for example, keep their fingers out of our domain. I have heard it said by surgeons more than once: "Why, we have to do mastoid operations because our specialists can't do them." Gentlemen, I consider this a slap in our very face. It is the very worst thing that can happen to the profession and patients if a man does not master his own specialty. Of course, it implies that every specialist is a surgeon and a good surgeon, and has the experience of general practice. There is no question about that, and will, of course, be among the requirements of a specialist. This is just the point that Dr. Shambaugh brings out. The consequence of this very point, too, is that we have to fight to keep the surgeons out of our field. Can they do good work? Can they diagnose our cases? In one week alone three cases were sent to me for mastoid operation, all three of which required only a little Politzerization and a little ice applied over the mastoid region, and they got well in no time. I am safe to say that any surgeon would have operated on all three. Is it any better with the adenoid operations? How many times, after adenoid operations, do we have to take care of our patient and watch him for months in order to cure an affection of the tube; to bring the drumhead back to normal? Which surgeon would bother about this? Still, without it nothing is accomplished for the patient. Therefore I say these two subjects, systematic education of the specialist and the specialty for the specialist, are one and the same thing, and as soon as we can bring it about, let us, first, get a better training for our specialists, and then, next, let us retain the specialties for the specialist.

Dr. Stucky:-I feel that a paper like the one Dr. Shambaugh has given us ought not to go without a pretty free discussion and commendation. I do not believe that any paper will come before this Academy that will carry more weight with it than this one of Dr. Shambaugh's-elevating the standard of education for the development of the practitioner of oto-laryngology. Those of you who began when I did-a little earlier or a little later-had the hardest kind of a fight to unlearn some of the things we had learned, simply because we did not get the right kind of a start, and the reason why a good many of us are enthusiastic attendants at this Academy and other national meetings is because we begin to realize every year the necessity of postgraduate work, and we get it here. Now just why it should ever have been encouraged for any man to go and take a special course for four or six weeks, receive a diploma, and then be a rhinologist or otologist, God Almighty only knows; I don't. And yet that is a fact. You, and occasionally myself, are undoing every few days some of the work that has been done by good men who are well recognized-operations in the throat, secondary tonsil operations, breaking up adhesions in the naso-pharynx, pulling out the Eustachian tube, all because of the fact that the rhinologist and otologist, until a few years ago, has been considered as one doing piddling surgery. Keen, of Philadelphia, says he will never do another mastoid. You heard the compliment bestowed upon us yesterday by Crile, of Cleveland. We are beginning to be recognized because we are elevating the standard of our specialty. And I believe that the time limit placed by the essayist-two years-is little enough, and if I had to live my life over again I believe I would work at it four years before I would be willing to witness some of the living monuments of my surgery that I see walking around.

There is one point Dr. Shambaugh hinted at that he did not enlarge upon, and I want to mention it simply to emphasize it and, if I may, enlarge upon it. I believe with Dr. Holinger that a man should be a specialist. You want to be a specialist, not a general surgeon, but I also believe that the only real, safe, true foundation for any specialty is general medicine first. I hammered away for twelve years in general surgery and general medicine, and I tell you, gentlemen, I would not take anything for the hard earned experience of the general practitioner. I can not treat some diseases of the ear, and the nose, and the throat, except through the general system, and I am beginning to believe more and more that in our specialty there are two lines of treatment—in otology and rhinology, and oto-laryngology—and what is not amenable to systemic treatment is amenable to surgical treatment. I do less spraying and less piddling in the nose and throat than I ever did.

And I commend the attitude of the essayist. I believe in the stand for higher, deeper and broader education of the oto-laryngologist.

Dr. Pynchon:—In the paper and in the discussions there have been some criticisms made regarding certain colleges that graduate young physicians in rhinology, otology and laryngology, giving them a diploma and sending them out broadcast on the world. Now those statements are made on false grounds. I happen myself to have been connected with the Chicago Eye, Ear, Nose and Throat College for several years. We never gave any diplomas. All we gave was a certificate stating the time of attendance and only to those who were graduates of medicine, and for the first month it was simply a sort of postgraduate instruction, to open up

the eyes of the doctors, after which the majority of those doctors went home much better prepared to read and digest their rhinological reading and improve their education in that line, and many of them came back for more. We have several students who have returned for three and four courses, and we can point with pride to a great many gentlemen who have acquired their education in our college and who have since become quite prominent in their respective fields of practice. Another thing as to the intimation that the doctor who is in general practice, never having thought anything of the nose and throat, gets the bee in his head to be a rhinologist and takes one of these special courses, after which he practices as a specialist. As a matter of fact, the man who selects the nose and throat as a specialty has had it in his mind for years, and feels competent to take it up, so those criticisms should be modified.

Dr. Hal Foster:—It seems to me that the future laryngologist must be a surgeon, a man who is competent to do surgery of the larynx and, as Dr. Holinger says, to remove tumors and growths in the region of the neck. That is one reason perhaps that the general surgeon has tried to usurp our field. For many years we have been in the habit of calling upon him to do our operations, such as removing a sarcoma, etc., but I think the future laryngologist must be trained as a surgeon in that part of the head, so that he is competent to do that kind of work.

Dr. Louchery:-Looking around me I do not see many men who remember the time, as I do, when we had no graduate physicians. neighbors would look to the men in the community who were generally adapted for giving good sensible advice, so they would begin to consult them about their medical ailments, and they gradually grew up to be their physicians. It was a very excellent way of selecting the fit men for the profession. It was one of the most excellent means of selecting good doctors. Many of them became great and good practitioners for their time. We are now requiring a four or five years course. That is right; it ought to be greater. They ought to be college graduates before they practice. But here is one point; many men go into the profession who never can be adapted for its practice and treatment; they have not got that particular mental trait or talent. They or their friends have rather forced them into a profession for which they are not adapted. That is one of the discouraging features. Another is this, as to postgraduate work. I was a general practitioner, and I graduated from the Medical School at the University of Maryland, in Baltimore. I practiced general medicine and surgery for many years, and finally entered the specialty of the eye and ear because we had no one in our community within a hundred miles doing that work. I saw men die of mastoid disease, and I felt it was my duty to enter the field and try to develop into an aural and eye surgeon and do what I could for the people in my community. And I have been faithful and earnest in the study. I am far back in the rear, behind what I should be in the special work, because I lacked the early equipment, and yet with all that I am able to do a great deal of special work. I have had the general surgeon, who has never had any preparation, not even any special preparation, watch me from behind my back while I was doing a mastoid operation, and then sail in and do the mastoid operation himself, very imperfectly, of course. I have known him to do the removal of an eye and then try to insert an artificial eye after removal of all the ocular conjunctiva, and wonder why it would not stay in.

The medical profession is a very unpromising field for the young man to-day. You have to put him in school for a four or five years' course, then two or three years of special training, and then when he finally gets out into practice he has to compete with everybody. You must do a great part of your work for nothing, and then the general practitioner will com-

pete with you and do the work cheaper. I would not advise my son to study medicine; there are too many discouragements. Certainly the Doctor is right. When in New York I saw bright men come there to school. They went out as well equipped specialists. They had no knowledge of general medicine only as they had obtained their degree; they had no practice in it. They start out for general special work and think they are high grade specialists on account of their training. As a matter of fact, we need the ground work; we need a more thorough training in college, and the general practitioners will then specialize for two or three years under competent teachers before we are fit to do that higher grade of work. By and by we shall do much better.

Dr. H. G. SHERMAN:-I came in just as the Doctor was saying he would not advise his son to study medicine. I have a youngster somewhere around here and I am advising him to study medicine. I am advising him to study medicine because I believe that every man, in choosing a vocation, has two questions to settle. First: Would he be more satisfied in life's work to obtain or acquire money, which is merely an acquisition, or would he be more satisfied in life's work to attain and, therefore, develop his individualism in life? While one is fully as compensating as the other, depending entirely upon the point of view-if a man would rather possess thousands of dollars and live in the community, estimated simply by his wealth-that is one view of life. Within the last week one of my neighbors, an estimable man, apparently highly respected in the community, suddenly lost his wealth. The neighbors have lost interest in him, and the poor fellow is broken-hearted. That does not occur to the physician. The status of the physician in the community is never determined by the amount of money he may possess; it is by what he has attained in life which constitutes an ambition and growth that, it seems to me, should appeal to men more than any possible returns that money gives. Therefore, I want to protest against the Doctor's expression for this small boy of mine, for I am drilling into him that there is nothing in life which will bring back the compensations of the realization that he is contributing much to others and attaining for himself that which no man can take away.

Dr. Dean:-I would like to say that if the suggestions of Dr. Sham baugh should be carried out there would be far less loss of turbinal tissue by and fewer septum perforations in the citizens of Iowa than we are having to-day. Yesterday one of the members of this section and myself were discussing this very subject, and, in the opinion of the gentleman in question, he thought it was our duty to go to some of these men who had not sufficient training, and who were using a spokeshave, and who were do doubt doing these people a great deal of damage—as he sees in his practice and I see in mine—and try to correct their work. As a matter of fact, it seems to me that that would be a very egotistical procedure; at least I would not care to say that to any man, whether he were young or old, and, as I told him then, the only solution of the question was to bring about some method whereby these people would be compelled, or at least would see the necessity of receiving proper medical education. Along the same line I would like to say I am very sorry that we have not had a paper upon the undergraduate teaching of ear, nose and throat, because I think there is a question that is not thoroughly understood, and it is one of great importance to the members of our specialty. In connection with what Dr. Stucky said regarding work in internal medicine before taking up the specialty, I think there is one thing which has not been mentioned, and that is, that we, as specialists, have passed the time when we are going to confine ourselves to doing minor work. As a matter of fact, we must do major surgery-we must operate upon abscesses of the brain, on diseases of the lateral sinus, we should do work in the neck. We should do those operations that are frequently accompanied by most severe hemorrhage and shock. It has been my experience that some of the members of our profession who are attempting this work have difficulty because they neglect those conditions which no general surgeon would neglect under the same circumstances. Any one that is practicing ear, nose and throat may at some time, if he has not been doing this major work, be compelled to do it, and perhaps because of his lack of earlier training he may make a mistake. In my judgment, one of the best preparations, one of the best methods of getting a good foundation for the practice of otology and rhino-laryngology, is to spend one year as an internist in some good hospital, and I have given that advice to many boys, and I believe that they have secured great good, at least, they say they have. They get the training that is necessary to do the major work when it comes to them.

Dr. Young:-There are two or three matters brought up in this discussion which I think ought to be gone over a little more carefully, because from the discussion had here this morning we may be put in a sort of false position. In the first place, a recent experience I have had touches one of these points. I was called as a witness in a damage suit where an eye had been lost. The defending attorney attempted to throw some discredit upon my evidence by raising the question as to my qualifications to testify in such matters, and he endeavored to throw that doubt upon my standing by asking me whether I was a graduate of any of the special schools, those of ophthalmology. This applies, of course, as well to otology. I told him that I did not know of any special schools of ophthalmology; that I was a graduate in medicine, of a certain date, and of a certain university; that I had been practicing my profession for twenty-eight years; that my education had been acquired in various ways-clinics, mostly, in special institutions where such things were exclusively taught. Then he asked me how long since I had gone to a school in this specialty. Here I bring out the point which Dr. Stucky makes. I told him that I go to school now one day every month-showing the advantage of meeting with men in the same line of work as myself in these associations.

Another thing that has been brought up, about this idea of the specialty for the specialist. If we are going to branch off, as we must, into surgery of the head and neck, brain abscesses, sinus thrombosis, tumors of the neck, etc., how can we criticize the general surgeon who comes into our domain? It simply becomes a matter of individual conscience, whether one can feel that he is competent to go on after he has his preliminary education, it seems to me. So far as I am concerned, I don't want to encroach upon the work of the general surgeon, because he is a specialist as well as myself. Our work sometimes overlaps, which was very evident only within the last two weeks, when I was called into consultation by the general surgeon for an injury to the head, which, after the lapse of a week, showed a proptosis of the eye on the injured side; and he wanted my opinion of the case because there was no definite lesion indicating the traumatism. The point of traumatism was on the outer margin of the orbit, and I told him that there was a fracture of the orbital plate of the frontal bone and that an operation was necessary, without which we would have brain abscess and a fatal result. On the strength of my positive assurance he made an opening and removed a number of fragments of

The question of medical education for a specialist, it seems to me, must depend largely upon the question of education of the physician in the first

place. I most thoroughly endorse Dr. Stucky's position, the education for general practice, which is absolutely essential to the acquirement of special work, and I say that whatever arrangements we agree upon as to requirements of special work, we should as a preliminary insist upon three or five years of general practice, so that the man can demonstrate to himself what his particular adaptability is.

Dr. Shurly:-It is an unfortunate fact that the working out of this problem of special medical education is influenced more by the demand of public opinion than by almost any other factor, and as it is somewhat necessary for us to supply this demand as it exists, the practical and possible working out of this problem is one of years in the future. Dr. Shambaugh has certainly the ideal proposition so far as medical education of the specialist is concerned, and it seems to me that that ideal will ultimately be a medical center, such as Chicago and New York, with schools of special training that allow the individual to comply with all of these requirements which are absolutely necessary. Now each and every one of us has some definite idea or opinion upon this problem. We have all carried it out in some details which were influenced more or less by the way in which it was possible for us as individuals, and it seems to me that our endeavor should be to stimulate public opinion in such a way that it will demand better and better work in the specialist, so that the demand of the people will be for a trained man who is trained in every detail of his department, and the way in which this is accomplished, of course, will differ according to our own separate opinions. My own opinion is that the ideal can only be approximated by the most perfect groundwork. A pre-medical course, such as is offered by some of our leading universities, as a preparation for an understanding of the complicated and complex problems before the specialist is an absolute essential, and after that I feel that a general practice of five years at least-from five to ten years if possible-is an asset that will be felt of the greatest value to the individual in his ultimate years of special practice. There is no other training, to my own mind, that will possibly make up for that loss of understanding human nature in the familiar phases of disease.

Dr. Beck:-I am very glad to see that the men have been so free in the discussion. I would like to make one point, and that is this: must take into consideration the circumstances of the specialist. student specialist is influenced a great deal by his financial condition at the time he wants to undertake his special work, and if a man asks me. I say that he should be associated with a specialist for a long time for the benefit of both. It is not good practice to take him for a year and train another every year. It is too much work for the specialist. But he should take him for three, four or five years, during which time he must compensate this man for his work, and he will do a great deal in that way of making a good man of him. I also want to make a point as to the relation of the advanced specialist. I tried to bring that out in my address yesterday. I believe we must advance in the line of advanced surgery. It is absolutely necessary that we be general surgeons and not tinkering operators. I speak from personal experience, and I know I can do this work better because I do it by getting better and proper training before being a specialist. So far as going abroad, I think the time is coming very rapidly when that will be found unnecessary, and that our own men here can teach all that is necessary. I believe the ideal method of development is individual training, have the young man under your personal care. I will now ask Dr. Shambaugh to close.

Dr. Shambaugh (closing the discussion):—I am very much pleased with the discussion that this paper has brought about. There are many

questions that I should like to discuss further, but do not care to take up any more time of this meeting. There were several points raised in the discussion, however, that I should like to refer to. One was the question of the specialties for the specialists. It is true that the general surgeons, in some parts of the country at least, still imagine that they are prepared to undertake the operations in any of the special fields. It is only the man who has given to any of these specialties enough study and attention to understand what is actually being done, who realizes how absurd it is for the general surgeon to attempt to do work of this sort. It is the duty of the specialist to make this point quite clear, that the technical work in the specialties has gone so far that they are entirely beyond the scope of the general surgeon. There can, of course, be no criticism of the general surgeon who undertakes to operate upon the mastoid, for example, provided he has given to the study of the ear the same attention which the well-trained specialist has done. Some surgeons, undoubtedly, have done this in one field, for example, but it is quite impossible for any surgeon to assume to master all the technical details of the special operations in all of the special fields.

In regard to the question of going abroad for special work, the necessity for going abroad has long since disappeared. Opportunities exist in this country for the same sort of training that can be gotten by a trip abroad. We all know that a trip to Europe is frequently undertaken simply for the prestige which a few weeks' abroad may be supposed to give a person. I do not mean to say that it is useless to go to Europe for special study. Many find that it is just as easy to go abroad to study as it is to study at home. What we need to emphasize is that a physician can not prepare properly for work in a specialty in six weeks either in this country or in any other country. If one is willing to work, the opportunities for study can be found here as well as elsewhere.

I want to refer again to the criticism I made of the method in vogue in our postgraduate schools, of issuing certificates after a few weeks' attendance, which certificates are used to lead the people to believe that the individual has been properly trained to do special work. I think this a very objectionable custom and one that should be discontinued. It puts the postgraduate schools practically on the same basis as any fake diploma mill. Such certificates can be secured by any one attending a postgraduate school for a few weeks. Whether he is in any way prepared to do special work, or has done any studying while attending this school, makes no difference. These certificates have actually no value, therefore, and their possession is often used, as I have just stated, to lead their patients to believe that they are specialists.

A FURTHER STUDY OF LARYNGEAL NEOPLASMS IN AMERICA.

(Being a continuation of the paper read before the American Academy of Ophthalmology and Oto-Laryngology at Louisville, September, 1907).

J. LESLIE DAVIS, M.D.

The scientific mind of the human race, even for centuries following that period designated in history as the Dark Ages, suffered from chronic apathy, from which recovery has been slow.

"As it was in the beginning, is now, and ever shall be," had verily been the common chant of the ages, till slowly, but surely, the world moved out of darkness into light, and within the limit of less than a century have medical men awakened to the realization that it is day-break everywhere! How long we are to linger in the dawn of the morning, or how near we may be moving toward the zenith of attainment, must remain for observers of the future to determine. Yet knowing this, that each generation is "child and heir of all the past, and parent of all the future," may we so use our heritage that a modest pride at least in prophesy may well be justified.

From a perusal of history I am led to believe that as a factor in the retardation of scientific advancement, an undue regard for precedent has ever ranked higher than prejudice.

New trails through the wilderness of ignorance and superstition, almost without exception, have been hewn single handed; not so much because the people objected to the newer fields of thought, as that they were passively contented to continue in the beaten paths of their fathers. And while the majority may for a time have power to proclaim a principle, oft times has the principle been wrong, and it is, after all, the doubters who have been the promoters of development.

"All honor to him who honestly doubts, if through doubt arises investigation, and through investigation conviction."

Difficult indeed, then, is the endeavor to place a just, or even an approximate estimate on the value of current opinions. Years of distance seem necessary to give them a proper perspective; and absolutely impossible would be the attempt to strike an average—three opinions divided by three gives three opinions still.

So if from the complex collection of variously expressed thought I herein have not culled what your judgment would choose, I am grateful for your gift of charity. Not only with casual interest, then, but with positive gain might we give a few moments occasionally to serious restrospection, and, as suggested by Jonathan Wright, we may smile through comparison, but probably no more contemptuously than future historians will at some of our own ideas of etiology.

Strange does it seem to us to read (Jonathan Wright's History of Laryngology) that John C. Cheesman in reporting, in 1817, a case of papilloma of the vocal cords dying without relief, was the first man in America to describe a laryngeal growth. That Albers, in 1834, stated that tumors in the cavity of the larynx belong to a class remarkable alike for their rarity and their characteristic symptoms; and that in 1837 Trousseau and Belloc could only report from literature and their own experience seven cases.

In the same year (1837) Frederick Ryland in his book, "Diseases and Injuries to the Larynx and Trachea," states regarding acute laryngitis, that the mortality is very great; of 28 cases reported, 18 died; "but this," he says, "gives a too favorable view of the termination, to be accounted for by the disposition of mankind to vaunt of their success and conceal their failures." He divides the treatment into three divisions:

- i. Bleeding to the extent as to produce an approach to syncope, without absolute fainting.
 - 2. Leeches crowded all over the upper part of the neck.
 - 3. Bronchotomy, which is no good unless done early.

Of tumors of the larynx he states there are various species of accidental or morbid formations which may be developed in the cavity of the larynx, but from the infrequency of their occurrence, and the undistinguishing character of the symptoms they give rise to, they generally remain undetected until after death.

The first tumor taken up is "hydatids": "Most of these cases in the larynx, described by ancient writers, are considered by Albers to have been nothing but edema of the glottis. Hydatids, however, have been found in the air passages, but in most cases they are originally formed in the lungs, liver, or thyroid gland, and subsequently burst into the air tubes. A hydatid developed in one of the ventricles of the larynx has been known to project so far into the cavity of the organ as to give rise to all the symptoms which usually attend a foreign body there."

Polypus: "By far the most common tumor, but not indicated by any very characteristic signs, so consequently the disease is seldom discovered until after death."

Treatment: "If it were possible to ascertain the existence of a polypus in the larynx during life, it would be the duty of the surgeon to attempt its removal by the knife or by ligature around its base. For this purpose it would be necessary to divide the cricoid cartilage, and probably the thyroid also; but since the consequences of the polypus, if allowed to remain, are always mortal at some period or another, it would be right to give the patient this chance of relief from otherwise certain destruction. I am not aware of any case in which this operation has been undertaken.

"Other tumors have been occasionally described as scirrhous, though true scirrhous or carcinomatous affections of the larynx have seldom, or perhaps never been found, except when the disease has been propagated from the pharynx or esophagus."

In 1850 Ehrmann was able to collect in all thirty-one cases of tumors in the larynx.

In 1854 Robert Hunter published in New York a little volume entitled "Diseases of the Throat and Lungs," which as an example of some of the impressions sent out to appeal both to the physician and the lay mind is well worth quoting in this connection.

"Laryngitis is one of the most terrible maladies. There are few indeed of those who have been its subjects who have not also been its victims.

"The treatment of laryngitis has, I conceive, been much improved within the past ten years. The old routine, bleeding from the arm, calomel purges, and leeches to the neck, will end in failure in three cases out of four. I do not say that it is not often advisable to bleed, and beneficial to purge, but I do mean to say that if something more be not done, there are three chances for the patient to die, to one that he will recover.

"What then is that something? It is to make a direct local application to the part affected; to depress the tongue, so as to elevate the epiglottis and open the entrance into the larynx; then to pass into it, as advised by Belloc and Trousseau, a sponge charged with a strong solution of nitrate of silver. This is frequently difficult even to those who have had much experience, and always so to the general practitioner, to whom, however, it is unavoidable to delegate it under the urgency of the circumstances. The stake is life, and the grim tyrant, death, is already in the field with his entire force. The battle must be fought before the strength is exhausted,

or it will be lost in spite of all our art has to offer. Again and again, then, at intervals of a few hours, the application must be repeated, until imminent danger is past. In the interim, between the applications of the sponge, anodyne and emollient inhalations as hot as they can be borne, must be kept up from a suitable instrument, quiet enjoined, a diet of water gruel, which together with good nursing, will complete the victory, and rescue the patient from the jaws of death in three cases out of four."

In reference to tumors he has this paragraph: "In addition to inflammation, acute and chronic, the larynx is liable to abscess, to warty growths, and to polypi."

With the advent of the laryngoscope a great impetus was given to the study of laryngeal affections—and likewise, probably, to overenthusiasm. Lewen, in 1861, said that he had thus far seen fifty to sixty cases of laryngeal neoplasms, and that they were present in 5 or 6 per cent. of all laryngeal affections.

Following the publication of Morell McKenzie's essay in 1871 on "Growths in the Larynx," world-wide enthusiasm was aroused, and for many years nearly every writer on the subject of laryngeal tumors seemed to make it his aim to corroborate the teaching of McKenzie rather than to test it. In a measure this was right, since his record represented the careful observations in a large experience of a masterful mind pledged to high sincerity, which none could fail to recognize. But we beg for him tribute more worthy than worship; instead of mere praise, may we pledge him performance, and seek to make progress in the path he has pointed. And while even to this day are his tenets, as then published, for the greater part regarded as orthodox, within recent years, writers have broken away from the old custom of reporting the cases that follow his findings, and have dared to record original research, and independent thought.

So, again I say, all honor to any one who in the search after truth, armed with the assurance which earnest application with high sincerity give, is emboldened to defy the very foundations of the old dogmas if need be, and thrice fortunate is he who can see the new faith accepted ere his voice be silenced in sacrifice upon the altar which he has reared!

McKenzie's observations began in 1862 and in eight years he had seen 100 cases himself, and was able to collect the reports of 189 cases by others, published since the introduction of the laryngoscope. Of the benign laryngeal neoplasms the classification has remained but little changed during the past thirty years.

Always have papillomata been regarded by far the most frequent, with fibromata next in order, and cysts probably third, though far less frequently than fibromata.

Angiomata, lipomata, adenomata and myxomata are rare as compared with others and will be considered collectively.

Papillomata being the most frequent, are hence the most important from a practical standpoint. They may occur at any age, though perhaps more frequently in children, with this notable difference, that in adults they are more commonly single, and in children multiple. The tendency to recur after removal is more marked in the multiple variety. Arising in the majority of cases from the vocal cords, they may be found on the laryngeal surface of the epiglottis, the aryepiglottic folds, the arytenoids, ventricular bands, ventricles, interarytenoid space, and from the tracheal wall below the glottis.

According to location and size the presence of papillomata may be manifested by alteration in voice, varying from slight hoarseness to complete aphonia, cough, shortness of breath, stridor—particularly in children during sleep, and even alarming dyspnea and cyanosis to the point of complete suffocation. Any one of these symptoms, however, is but an indication for either direct or laryngoscopic inspection, by which methods only can a positive and accurate diagnosis be made.

No single cause or group of causes can be assigned as common to the production of these growths, though there is probably in each case some "inherent predisposition" (whatever that may mean) to which is added some form of local irritation, such as might result from acute infectious diseases, laryngeal irritation associated with repeated colds, diseased tonsils, adenoids, inhalation of irritant vapors, faulty instrumentation in treatment, or from any form of traumatic injury.

The treatment is surgical, and as to the method, the advice adopted by the international congress of 1881 is as generally accepted to-day as it was then, namely, "that every benign laryngeal tumor ought, if possible, be removed per vias naturales, and only if an experienced laryngologist has established the inexpediency of this method may the extralaryngeal operation be adopted."

An exception to this rule is that of multiple papillomata in children, in which the majority of evidence seems to be in favor of non-interference with the growth itself, with an attempt at absolute rest of the larvnx by means of tracheotomy.

J. Payson Clark, in a report last year of fourteen cases of papilloma in children treated in the Massachusetts General Hospital, asserts as a fundamental proposition, "that these growths will not yield to any form of treatment which has been attempted, however radical, until the period of active growth has passed. That cases of active recurrence belong exclusively to childhood, when the cell activity of the organism is at its highest." He favors the tracheotomy treatment with non-interference; and believes that the greater familiarity of operators with Kierstein's autoscope and Killian's tubes has made more remote the possible necessity of resorting to thyrotomy in any case.

Delevan, in the discussion of a case reported by McCreery, treated by tracheotomy, favors the same method, and adds "the growths are apt to recur up to a certain age, after which the tendency to recur diminishes. If, however, recurrence should take place later, it may be possible to operate with some chance of success."

In discussing the same paper John Rogers, in contrast to the others, stated that he believed that recurrence to be due to deficiency of excision. He had operated on two cases by opening the larynx and trachea. removed the papillomatous growths, then after the introduction of an intubation tube, closed the wound completely. There had been no recurrence one year later. He doubts whether the risk is any greater than with tracheotomy, and believes it preferable to subjecting a child to the wearing of a canula for two years, with the possibility, even then, of ultimate failure.

In my own limited experience with papillomata in children, I have seen but one case in which I believe external operative interference indicated, and in which the condition disclosed during operation, and the results following, seem amply to have justified that procedure.

I have purposely withheld both from last year's paper and from this any reports of my own cases. This one being of peculiar interest in this connection, however, I shall summarize the principal points, a full report of which will be incorporated in a later paper which I now have in preparation on laryngeal neoplasms, both benign and malignant, coming under my own observation.

CASE 1.—I. H., female, aged 8, with nothing in the family or personal history bearing on the case, was referred to me Dec. 2, 1907, by Dr. Hummell, a general practitioner, of Salem, N. J. He had seen her only the day before for the first time, finding her in a state of marked dyspnea with occasional spells simulating strangulation. He was able to obtain a sufficiently clear view with the laryngo-scope to detect a growth involving the epiglottis and entirely ob-

literating the view of the larynx, or the extent of the tumor, and advised the child's mother to bring her immediately to my office.

The history of her trouble, as obtained from her mother, and also from the child, who was unusually bright and intelligent, was that about fourteen months previously the child was suddenly "taken hoarse over night" and had never spoken in louder tones than a whisper since. Her family physician gave her some medicine to take which was changed several times, but never with any apparent improvement in her voice. Eight months later she "changed doctors," the new one putting her through a course of internal medication, and likewise without appreciable results. this discouragement she was taken to a hospital dispensary, where for the first time a larvngeal examination was made, and the mother was informed that the child had "tuberculosis of the throat; that she did not require any treatment; that she probably could not live long anyway, and the best thing was to keep her in the fresh air as much as possible, and feed her well, especially on eggs and milk." Up to this time there had not been any difficulty with breathing, nor was pain at any time present. Shortly following this time, however, which was three or four months before this history was taken, she began to have what her mother described as smothering and coughing spells, which gradually grew worse till she "had to be fanned all night to prevent her suffocating."

It was at this stage that I first saw her in my office on the evening of December 2. I have never seen a more tractable child, which enabled me to obtain a most satisfactory examination.

Sitting erect, with her head thrown well back, chin elevated and mouth wide open, the drawing out of her tongue afforded slight relief in respiration. The larvngoscopic image thus obtained was that of a nodular mass extending from the insertion of the right palatoglossus muscle and the base of the tonsil, across the base of the tongue, involving both the glossal and larvngeal surfaces of the epiglottis to the median line, and practically the whole larvngeal surface of the epiglottis. The growth was of sufficient size to obscure any further view of its extent into the larynx. She was sent at once to the Jefferson Hospital and prepared for operation. Under ether, which, with manipulation of the head position and tongue, she bore remarkably well, the growth was removed from its attachment to the tongue and from both surfaces of the epiglottisalso both faucial tonsils—cryptic, necrotic and submerged—were enucleated, and a small mass of adenoid tissue removed from the vault of the pharynx. The labored breathing was then only partially relieved, and by digital examination I was able to determine that the growth almost completely filled the larvnx, both above and below the vocal cords, and involving both cords themselves. Enough of the remaining mass was then removed to relieve to some extent the breathing, and the operation discontinued to prevent any further exhaustion, since she was already somewhat emaciated and greatly weakened, more through loss of sleep perhaps than from lack of nutrition. Two days later she was allowed to go home,

being informed that if she continued to breathe sufficiently well I would like her to have several weeks' rest and then return for another operation.

Convalescence was rapid, respiration more comfortable and deglutition unimpaired, though there was no improvement in her

On January 22 she was again admitted to the hospital, thyrotomy performed, the entire growth removed and a 10 per cent. solution of nitrate of silver applied to the area of attachment. An intubation tube was then inserted, and the wound closed with deep catgut sutures and silk sutures externally. Three days after operation the tube was withdrawn; on the tenth day the patient went home, the wound having healed by first intention with the exception of a small stitch abscess at the lower border, which, however, was entirely healed when she was again brought to the office a week later.

Within a month after operation she was speaking in distinct vocal tones, though coarse in quality with slight huskiness. From the time of the first operation for about two months she was given syrup of iodid of iron with simple syrup of hypophosphites. Sections from the growth removed were examined by Dr. John Funk, pathologist to the Jefferson Hospital, whose report is here given:

Patient.—I. H., Salem, N. J. Specimen: Tissue from tumor on epiglottis. Specimen consists of five pieces of tissue each measuring 0.5 cm. in diameter; combined weight, 0.4 gm. They are pinkish red in color, rather smooth, glistening and covered for most part by mucous membrane. One side of each is fragmented, pinkish red and granular, indicating that the tissue has been dissected from adjacent structures. The pieces were fixed in Heidenhain's solution embedded in paraffin, sectioned and stained in hematoxylin and Van Gieson, also with polychrome blue and carbol-fuchsin, then decolorized with Pappenheim's stain.

Histology.—The sections are covered at points with stratified and squamous epithelium cells resting in some places upon a delicate strand of fibrous tissue, apparently basement membrane. At other places the basement membrane is invisible, the epithelium appears to penetrate the submucosa; this displacement being due to perverted growth of the elements, which, however, are somewhat malformed. They are more or less spindle-shaped; the nuclei are intensely basic staining and the protoplasm acidophilic and granu-At one point the epithelium is covered by a mass if necrotic tissue in which there are but few fragments of cellular elements. The submucosa is abundantly infiltrated with small round mononuclear cells containing small round intensely basophilic nuclei; the protoplasm is very seanty. Most of these are probably hyalin cells. Polymorphonuclear leukocytes were not found. cells are many erythrocytes. The blood vessels are numerous, have very dense walls and are distended with red blood cells. have ruptured. The hyaline cells are especially abundant around the blood vessels. At one point in the submucosa is a mass of round mononuclear cells containing small round intensely basophilic

nuclei. The protoplasm is scanty, granular and basophilic. In places the cells are closely packed or grouped, resembling the structure of secondary lymph nodes. The deeper architecture is composed of dense wavy fibrous tissue infiltrated at some points by mononuclear cells probably hyaline in type. Here the blood vessels are less numerous and have better formed walls. Neither tubercle bacilli or other bacteria were found.

Diagnosis.—The condition is in all probability merely an inflammatory product, the nature of which could not be determined. There is no change indicative of tuberculosis, nor do the alterations present suggestive malignancy.

Respectfully submitted,

(Signed) JOHN FUNKE.

The treatment of papillomata in adults will be dealt with later under operative treatment of other benign growths.

Fibromata differ from papillomata in their firm, dense, fibrous consistency, and regularity of contour. Usually of a rounded or oval shape, they are in most cases found attached to the vocal cord and may have either a sessile or pedunculated base. They occur most frequently in adults, though Thomas J. Harris reported in 1905 a fibroma in the larynx of a child 3 years old. The etiology is no more clear than that of papillomata, and they rarely show any tendency to recur after removal.

Laryngeal cysts are far more rare than fibromata, yet they have been reported by many authors. D. Braden Kyle ("Diseases of Nose and Throat, 190?") states that there seems to be considerable confusion in the classification of cysts, due largely to different views as to the etiology and pathology of the various forms; and that the distinction does not seem to be made universally between cystic degeneration and a true cyst. Simple or retention cysts ("mucocele") he observes is common in the nose, nasopharynx and in the upper portion of the larynx. The cystoma, which may be found in the nose, nasopharynx, pharynx, or larynx, is a cystic dilatation of the lymph vessels normally present. It may occur at any age, although more commonly found after 25.

D. Crosby Green reported in 1907 a laryngeal cyst in a child 9 years of age, which doubtless existed since infancy, at which time the symptoms were first observed. He further calls attention to three reported cases of cysts of the epiglottis in the new-born, causing death, and suggests that possibly they may be more frequent than is generally supposed.

Cysts of the larynx occur most frequently perhaps attached to the laryngeal surface of the epiglottis and to the aryepiglottic folds. Occasional tendency to recurrence is attributed to incomplete obliteration of the sack. Angiomata, lipomata, adenomata, myxomata and chondromata, with all other distinct or combined varieties of new growths, are for the most part interesting phenomena because of the rarity of their occurrence; they present no characteristic differences in symptomatology, nor would any attempted prophylactic measures be practical, owing to the rarity of their occurrence, even though the etiology were known. Confusion in diagnosis may for a time be a disturbing feature, but even that, with our present knowledge of the more important neoplasms, may be obviated with little difficulty. The treatment is either surgical, or that of non-interference, the size, location and duration of the tumor when detected, with the presence or absence of disordered function of the larynx, being the determining factors.

Operation via Naturales.—When operation is determined upon a careful preparation of the patient can not be too strongly insisted upon; the most important part of which is to secure the absolute confidence of the patient. While in some cases the larynx may be cocainized and a growth removed at the first setting, yet with many patients, even though free from pain, a certain amount of nervousness from the sight of instruments and the consciousness of an operation being performed is a disturbing factor which must be overcome.

Thus it has been customary to carry the patient through a course of "training," by various manipulations about the larynx, till such can be accomplished with but slight excitation of the pharyngeal and laryngeal reflexes. The length of time required for this procedure involves the personal element on the part of both patient and physician. When, then, the tissues have attained a sufficient degree of tolerance, arrangements may be made for the actual operation.

Previously administered bromids, or a hypodermic injection of morphia ten minutes before the operation—for the patient, and an acquired immunity to impatience on the part of the surgeon, who is also saturated with pure and unadulterated tact and common sense, will, in the majority of cases, prove most effectual accessories.

The technic of operation I shall omit.

For each factor which the past generation has given toward the perfecting of laryngeal surgery let us not forget to be grateful.

The praises of cocain, in its conquest of pain, with the advantages of the laryngoscope have been sung in unison by the universe; advance in pathology has shared in the praise, and likewise antisepsis; but one which needs an added note in the final

grand chorus of recognition is the high perfection in the instrument makers' art, without which the greatest gift in surgical skill would be hopelessly handicapped.

Following the removal of the growth, it is deemed wise to apply to the base or point of attachment a caustic solution—nitrate of silver or even the actual cautery having been employed successfully.

In the case of recurrent papillomata in children, it has also been observed that the application of, or spraying with formalin—in varying strengths from 1:1,000 to 1:100 solution—seemed to terminate the tendency.

The after-care of the patient consists in complete rest of the larynx, till healing is complete, during which time the site of operation may be kept clean by an occasional alkaline spray or the gentle application of a bland oil solution.

For the same reason that I presented last year the subject of carcinoma for the beginning of my paper, namely, that it is the most important, do I now wish to close this one with brief reference by way of emphasis to the same condition.

The past year has not proved prolific with new theories; yet there has never been so much thorough, conscientious and intelligent work carried on in the field of original research as now.

While there is no desire on the part of any one to discredit the doctrines of other decades, within the past ten years there has developed a greater desire for reason in the search after truth than the world has ever known; and our motto and our mission is "Prove all things, that we may *know* to hold fast that which is good."

From recent literature on carcinoma I quote the following from Crile: "It has been stated, and I believe truly, that the greatest outstanding obligation of medical science to mankind is the discovery of the cause of cancer, or at least of a cure for it. There is at present a universal movement in this direction. Governments and individuals have provided funds for laboratories and hospitals, and many of the greatest minds of to-day are engaged in an effort to solve the cancer mystery. There is evidence that a reliable blood test for cancer may be established; and there is a possibility for utilizing for cure the immunity principle through transfusion of blood. A number of cases of sarcoma have been cured with Coley's toxins—and according to Coley, the postoperative use of mixed toxins is an aid.

"Relative to etiology, we may conclude that chronic irritations, ulcers and benign tumors are potential cancers, and should be considered in that light.

"The pre-cancer stage is the prophylactic stage. And while the treatment of pre-cancer states and benign tumors is effective, easy and safe, the treatment of developed cancer is to-day perhaps the most difficult problem of surgery."

Then what of the future?

The present is product of all the past; the sum total of failures and victories.

Equipped in this armor, we face the endless range of unborn years. May truth be crowned the victor.

DISCUSSION.

DR. SHURLY:-Much of this paper was given up to a consideration of aryngeal papillomata in children, and as nine of these cases have come under my direct supervision I have been particularly interested in the development of our treatment of these little sufferers. In connection with these nine cases which have come under my care in the last twelve years some very salient points have occurred to me which I should like to bring out. First of all, I feel that the diagnosis of laryngeal conditions in children from the standpoint of digital examination is a very much neglected A number of these cases of papilloma of the larynx in children I have been able to determine simply by digital examination. Frequently the arvtenoids and epiglottis are covered by these growths, and they have a peculiar soft feel that is at once indicative of this condition. And the value of digital examination in the larynx is of the very greatest importance in the diagnosis of the condition. These nine cases make a sum total of observations which have allowed us to make use of almost all the different methods of relief for this condition. One of these cases was purely a syphilitic condition, attended by perforation of the nasal septum and by syphilitic bone necrosis in the tibia. and this case responded in the course of three months absolutely; the voice returned, the growth diminished, until there is nothing at all to observe, under the intra-laryngeal applications of arbor vitæ, and the syphilitic treatment consisted of inunctions of mercury and iodin. The other cases were purely laryngeal papillomata, and tracheotomy was done on all of them. Certainly that is the first procedure which to me seems advisable. One of the cases, the first, required thyrotomy, others the forceps. We do much of this work by the sense of touch, just as we do an intubation, and those of us who are intubationists will realize how much work we can do digitally in the removal of these growths. It is really a simple matter to do this by the sense of touch, just as we would remove adenoids. The use of Jackson's autoscope has revolutionized all this work with children. It is a very simple matter to make the diagnosis, and within the last year I have operated on three cases by the use of a specially constructed laryngeal snareremoved these papillomata or fibromata with absolutely no reaction what-You can clear out these growths, do your tracheotomy first, and then clear the larynx. I have to report nine cases, all of which are alive to-day, and all of which have a perfect voice, except two cases; one of which has a tracheotomy tube at the present time, and another one, where there is a slight return of the growth. The rest of them seem to have no recurrence and have done very well, which is quite an unusual story.

DR. STEIN:—This is a very excellent paper by Dr. Davis. I think it is to be regretted that he did not give us the details of his methods of operation, particularly in view of his great experience and his ability; it

would be of particular interest for us to know his technique. We want to know his experience in the application of the newer method: I refer particularly to direct laryngeal removal and the newer methods introduced by Killian and Jackson. It seems, as Dr. Shurly has aptly remarked, that this direct method of reaching the larynx has certainly revolutionized the ease and facility with which one can recognize and diagnose many of these doubtful intra-laryngeal neoplasms, and at the same time has revolutionized the ease and certainty and the radical way of their removal. In the treatment of papilloma of the larynx it has been the unfortunate experience of most of us, I think, to have seen quite a few such cases wherein we have been handicapped by the want of a means of operating that would, in a certain measure, cure our patient of the possibility of any return and, at the same time, leave them free of any danger of complications. It is true that tracheotomy, by resting the larynx, has proven one of the best means in the hands of operators, and thyrotomy has given us an opportunity to inspect the interior of the larynx and remove in a very thorough manner all of such growths, but at the same time there is a danger ever present, which occurs very frequently, and that is a tendency to inflammation of the lower respiratory tract. It seems by this newer method of direct laryngoscopy we can reach in a more thorough manner these growths, diagnose and remove them, and at the same time avoid the complications referred to which result from external cutting operations.

DR. STUCKY:—Just one point brought out by the essayist's paper I want to call attention to: I suppose one reason he did not have more to say about direct laryngoscopy, the direct method referred to by the two who have just discussed the paper, is that he can do more with the indirect than most of us can with the direct method. If I could see and get down into the larynx with the indirect method I do not know whether I would use the direct method or not. But that is neither here nor there. All of my views of laryngeal work have been completely revolutionzed within the last year, and when we recognize a growth in the larynx instead of training the patient, instead of using a great deal of cocain, I think it is a lot safer and more satisfactory to give an anesthetic and then use the direct method as developed by Killian and our own Chevalier Jackson, whom I believe to-day is Killian's equal.

In regard to anesthesia, you remember several years ago I presented to the profession, or reviewed the method of etherization by rectum. I am still convinced that that is the best method for using general anesthesia in these laryngeal and throat cases. I am more and more convinced, as I shall try to bring out to-morrow in the case I shall report in detail at the clinical session, that the operation of thyrotomy should be the operation of selection in a far larger number of cases than it now is, and I would be inclined, where I could not remove the growth at one sitting by the direct method, to advocate the other method of thyrotomy. I would like to ask the essayist in closing the discussion to tell us what method of anesthesia he uses and how he regards the direct versus the indirect method of removing these neoplasms.

DR. BECK:—The case that Dr. Davis refers to I presented before the Chicago Laryngological Society over a year ago. It was a case of papilloma, was diagnosed by digital examination and by tongue depression, by the Kirstein method. At the time of operation we did not have the newer apparatus, but you could see the characteristic lobulated appearance of a papilloma. I did a tracheotomy—I had just read Clark's article—and as the patient was about to collapse from the deep anesthesia I simply left in the tube and terminated the procedure at this moment; let the child recover and I allowed it to run about for two months. I then removed the

tube and allowed the opening to close. I see the case from time to time and it is absolutely well now. I have since then treated another case of a similar nature, which had been operated before—did a tracheotomy but was forced to remove the growth by another method. It proves this. The cause of papilloma has been said to be due to a continuous irritation, and consequently surgical interference towards these papillomata is always a fresh source of irritation, and they will grow and reform unless we can remove the irritation and put the larynx at rest. I have also reported since that time a cyst of the epiglottis, which was operated with Jackson's autoscope in a very satisfactory way. I would also like to say about rectal anesthesia that when Dr. Stucky first presented it to this society it was not accepted very kindly. Now it is being accepted abroad and in this country, and if it can be perfected we are going to have a very much nicer anesthetic by ether, oxygen gas, etc.

DR. DAVIS (closing the discussion): - The points that have been brought out in the discussion still further emphasize the point I attempted to make, that the main peril in the retardation of our progress has been that we have feared to do anything which was an advance over the rules that have been established. If we did we were evidently afraid to say anything about it, and it is only just recently that we are beginning to do new things, or at least acknowledge it, and I believe the next few years will show wonderful progress in this field. And in that respect I feel that I, likely, have been worse than any one else. In regard to my experience with the direct method-autoscopy-I have only within the past year begun to use it or operate in that way. I have used the old method of laryngoscope and laryngeal cutting forceps, and even now I have not attempted operation with the direct method for any tumor that extended beyond the vocal cords. Down to that point it has worked with wonderful success. As I also stated-which will answer Dr. Stein's reference to my not giving my technique of operation-I have purposely withheld my own experiences, with the exception of one case. I started out with the statement that it was a survey of the literature of other men's experience in trying to pass judgment to that extent that I might draw conclusions from the published experience and the records I have gotten directly from the men in America. I did not wish to be placed in the position of comparing my own work with it, since some of my own experiences differ from theirs, as well as my conclusions, and I felt it were better to first cover this from the standpoint of others' experience, and then in the paper I have now in course of preparation I have given my own experience for what it is worth, and my failures and successes, and I trust that it may be of some benefit later.

With reference to anesthesia, I have used altogether a local anesthesia—cocain—or etherization. I have never attempted rectal anesthesia, but I am quite convinced, with regard to anesthesia, that there is great opportunity for improvement in our methods.

THE AFTER-TREATMENT OF THE TONSIL WOUND.

EDWIN PYNCHON, M.D. CHICAGO.

The wound after ordinary tonsillotomy seldom requires any special after-treatment, and the decapitated stump is rarely a source of annoyance to the patient.

As tonsillotomy is at best only a makeshift operation, and gives only partial relief from the disadvantages and dangers associated with the pathologic or hypertrophied tonsil, the trend of recent years is toward thorough removal or tonsillectomy, whereby the tonsil is removed in its entirety, including its capsule, and the entire supratonsillar fossa exposed.

Such thorough removal by any process, be it either by cautery dissection or with cutting instruments, causes of necessity a deep depression or wound, which during the process of healing is benefited by rational after-treatment to modify the soreness and hasten a favorable termination.

The varying degree of soreness present in different cases, in fact, even between the two sides in the same patient wherein both tonsils have been removed by the same method, leaving wounds equally extensive and deep, has often been to me an unexplained enigma.

The size of the wound, in fact, does not seem to be a factor in the formula, for not infrequently the smaller wound has evidenced the greater reaction. Neither has the "wounding of the pillars," upon which some writers have laid such stress, been the cause of the reaction in these cases cited, in which the soreness has varied between the two wounds, for in each case the lines of incision have been the same. In fact, the leaving of too much of that which is looked upon as the anterior pillar, I have often observed, was a source of aggravation, instead of being a benefit.

Regarding this feature an explanation is required. When the tonsil is in repose in its bed the posterior line of the anterior pillar seems to lay well over the tonsil, but when the tonsil is pulled out of its bed the muscular fibers, which really constitute the pillar, are seen to advance, while the posterior portion of the mucous membrane, being devoid of muscular fibers, is stretched and shown attached to the tonsil which, through the traction applied, is caused to move about. Much of this portion of the mucous membrane I find it wise to remove with the tonsil.

When this hypertrophied membrane extends downward and backward to the posterior pillar, covering the lower portion of the tonsil, it is known as the plica triangularis, but often this latter described extension is not present. In either case, whether present with or without the plica triangularis, my experience has taught me that a liberal removal thereof is beneficial. I therefore aim to have a wound the side walls of which slope toward the central base and the contour of which from front to rear is oval.

By such sacrifice of the hypertrophied mucous membrane of the anterior pillar there is facilitated a better removal of the anterior portion of the tonsil which has been named the "velar lobe." In the same way, in order to expose and clear out the supratonsillar fossa, it is necessary to have the lateral incisions join at a point somewhat higher than seems required when the tonsil is inspected when in repose in its bed. In fact, the apex of the superior portion of the wound extends as high or even higher than a line extending horizontally from the base of the uvula.

The wound after a complete tonsillectomy is so planned that no portion of the outer membrane is allowed to extend over a recess; in fact, so the resulting wound is free and open.

And now: what is the chief cause of the soreness which at times is so pronounced? In the case of "cautery dissection" those who employ other methods allege that the soreness is due to the combination of a burn with a cut. As previously stated, my personal experience negates this theory. In fact, the sorest throat following a tonsillectomy of which I know occurred in the practice of a confrère in a case wherein the tonsils were removed with cutting instruments. I have also known of marked soreness following the use of the snare, and furthermore of pronounced hemorrhage after the use of this bloodless implement—as alleged by some—the cold snare.

The degree of soreness following a radical removal of the tonsil seems to be in part due to the idiosyncracy or physical condition of the patient. Postoperative infection is probably the most frequent cause thereof. Infection at the time of the operation may also occur in case cutting instruments are employed, though in this age of aseptic surgery this cause may be considered as being of infrequent occurrence. Of course, from its very nature, the cautery dissection operation can not receive this blame, as it would be rather difficult for germs to maintain their normal activity, when in contact with a red-hot iridoplatinum electrode.

I have frequently noticed that there was a more marked reaction in case the tonsil had been subject to attacks of quinsy. Generally speaking, adults experience more soreness than children, adult men more soreness than adult women, and fat people more soreness than lean people. A fat German of 40 or over has generally seemed to be the greatest sufferer. Can the large amount of lager which the average Teuton absorbs he considered as a predisposing cause for this soreness?

After a radical removal of the tonsil by any method the wound soon becomes coated with a layer of white necrotic tissue. In case of the cautery dissection operation this is immediately produced by the burn and the solution of silver thereafter applied. As soon as formed, being an early protective to the wound to prevent hemorrhage, Nature begins a process whereby its dissolution is effected through decay. Through the absorption of ptomaines from this slough, as well as from bacterial infection of the open wound, we have the most rational explanation of the soreness which begins to be annoying a few hours after the operation.

With this understanding the rationale becomes apparent for very frequent cleansing of the wound. For many years I depended chiefly upon gargles and have often observed their efficiency when faithfully and continuously employed, say every ten or fifteen minutes for the first twelve hours and less frequently thereafter. The great trouble has been that the gargle has not been employed with sufficient persistence before the soreness developed; in other words, prior to the time when absorption of the ptomaines from dead tissue begins.

Another reason why even frequent gargling in some cases has not prevented marked soreness is due to the fact that all patients are not equally adept in the use of the gargle, and in thus cleansing the wound. This particularly applies in the case of small children. Latterly I have been employing with much satisfaction, as an adjunct to the gargle, the use of a suitable syringe whereby the wound can be better cleansed every hour or two. The best syringe I have found for this purpose is the one-half ounce hard rubber postnasal syringe whereby both sufficient force and a spray stream are secured so the wound may be effectively washed. As a cleansing agent I depend chiefly upon a 2 per cent. solution of Merck's sodium bicarbonate, which means a heaping teaspoonful to a large glass of water holding one-half pint. If instead of plain water there be mixed therewith 25 per cent. of some one of the aromatic vegetable antiseptics its taste as well as efficiency is improved. Thymoline

or oleoseptine are either good and are the best agents of this class of which I know, the latter being the more aromatic of the two.

After the first week I generally substitute either a gargle of the chlorate of potash or else a weak solution of the tincture of myrrh, about 15 drops to a wineglassful of water. Occasionally a slight degree of fever is manifested. This is easily controlled by an hourly dose of one drop of the tincture of aconite root. The diaphoresis thus produced seems to also favorably affect the soreness of the wound. If the tongue becomes much coated I order a saline purge at night, preferably the sulphate of magnesia. This may be repeated if required.

It occasionally occurs at the time of operation, no matter how carefully performed, that there is overlooked a little of the tonsillar tissue which should have been removed. This is most often due to the operative field having been somewhat obscured by even a trifling hemorrhage. Upon a subsequent visit, when there is lost the shrinking effect due to the hemorrhage, as well as to the cocain if local anesthesia was employed, and when even a small particle has become materially increased in size through the inflammation present, it may seem that an imperfect operation has been done. Two or three applications of a 20 per cent. solution of cocain to denuded and projecting points will in a brief time give complete anesthesia, when with a suitable tonsil punch¹ these points of roughness or elevation can be easily and painlessly removed so as to give the wound its correct oval contour as previously described.

During the healing of the wound the tendency for it to fill up with granulation tissue differs in different patients. With some a pretty depression or cavity remains without any special effort on the part of the surgeon, while with other patients there is a marked tendency to overgranulation or filling up of the wound. In this way is explained that which has been regarded as cicatricial contraction. As far as complete relief from the symptoms or conditions which called for the operation are concerned this is immaterial, but for cosmetic and other reasons is undesirable and therefore calls for special treatment.

One of the structural disadvantages of the submerged tonsil is that through its adhesion to the pillars their independence and mobility are impaired, and thus also secondary thereto free and full motion of the soft palate with its dependent uvula.

Through free and unrestrained motion of these described structures the palatonasal opening may be greatly enlarged by action

^{1.} Tonsillectomy in Children Under General Anesthesia—a Hospital Operation, The Journal A. M. A., June 20, 1908.

of the associate muscles, thus permitting a larger column of air to enter the postnasal space in vocalization which intensifies the power of the high register. Furthermore, by muscular control of the size of this opening and the tremor of the soft palate easily attained when the parts are free and mobile, the head tones are softened and beautified.

For these reasons during the healing of the tonsil wound, and formation of new tissue incident thereto, it is desirable that excessive growth shall be checked or controlled so there will remain permanently between the pillars some concavity. The pillars in vocalization can thus somewhat approximate.

For the purpose of controlling exuberant granulation I depend upon daily massage with a cotton wound applicator suitably medicated. After experimenting with many agents I always return to my first selection, the "eisen-glycerin" of the Vienna Clinics, consisting of equal parts of the muriated tincture of iron and glycerin. An extra long applicator with a handle is most convenient for this purpose.



Fig. 1.—Tonsil Wound Masseur (1/2 size).

Iron is the most efficient agent I can find to diminish the soreness. In fact, in some cases I additionally prescribe an iron mixture, as recommended so heartily by Bosworth, consisting of one-half dram or one dram of the muriated tincture to the ounce of glycerin, and given in teaspoonful doses every two hours, swallowed slowly and undiluted.

For the first few days prior to the massage with "eisen-glycerin" I apply peroxid of hydrogen after cleansing with an alkaline spray. This seems to soften the eschar and hasten its dissolution. The force with which the massage is applied is, of course, regulated by the degree of soreness present. At the start the massage is gentle, but can be increased day by day until about the eighth day, when sufficient force may be employed to rub off the filling-in tissue so as to produce slight hemorrhage. In this way the surface is caused to become smooth and firm. In a few days no further hemorrhage can be thus produced.

Occasionally, where an unusual degree of new tissue formation takes place, say about the tenth or twelfth day, and more particularly when treatments have been skipped or omitted for even three or four days, the new tissue formation will be found to be too dense to be suitably rubbed down with the cotton wrapped masseur so it becomes desirable to resort to a more efficient procedure. In such cases I employ the tonsil wound rasp (Fig. 2). After its use once in most cases, and possibly on a succeeding day in rare cases, the treatment is completed with the masseur until the wound is fully healed.

When the ideal result desired is attained the mucous membrane covering of all the structures involved becomes as smooth as the roof of the mouth, with no visible depressions or remaining crypts on the site of the tonsil, and eventually a fading out of that characteristic arch of redness previously described² which always constitutes a feature of the picture seen in the examination of a throat



Fig. 2.—Author's Tonsil Wound Rasp (2/5 size).

in which are present submerged or diseased tonsils. Lastly, a slight depression between the pillars is present and no bulging out at this point occurs when the patient is made to gag, as always occurs when even a deeply submerged tonsil is ensconsed between the faucial pillars.

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DISCUSSION.

Dr. Dean:-I am very glad to hear this paper by Dr. Pynchon, because I fear almost all of us neglect these cases more or less after operation on the tonsils. We must remember that it makes no difference how aseptic we are at the time of operation on the tonsils; it is impossible to sterilize the buccal cavity and the throat; as a matter of fact, it is easy for infection to take place after the operation, and as a result of this infection we may have sequelæ that are, indeed, serious. Some three years ago I operated on a clinical patient; performed a tonsillectomy on a boy 12 years of age, and the next day his parents, against our orders, took him away from the hospital. Seven days afterwards the family physician telephoned me regarding the case, saying that the boy was very sick. About nine days after the operation I saw the boy, and he had a thrombosis of the lateral sinus, thrombosis of the cavernous sinus on the opposite side, with exophthalmos and panophthalmitis on the opposite side, and optic neuritis on the same side. Strange as it may seem, this boy recovered without operative procedure. Since then I have noticed, in foreign literature, the report of a similar case following tonsillectomy performed by a surgeon in the German army. During the last year I have noticed that my patients in clinical practice have suffered more or less after the operation, more than those in my private practice. Both classes of cases are required to remain in the hospital, but in clinical practice

^{2.} The Degenerate Tonsil, THE JOURNAL A. M. A., March 21, 1903.

they are not so directly under my observation and my assistants are not inclined to follow out exactly the course of treatment as directed in this class of cases. During the last year we have had a number of cases of high temperature coming in some four or five days after the operation, and we had complications which we have not had in the other class of patients. I believe this was simply due to the fact that the throat was not kept cleansed as ordered and the treatment not carried out as suggested by Dr. Pynchon.

Dr. Pyfer:—My experience has been that the most painful way to remove a tonsil is with the hot cautery, the next after that the snare, and the least painful is with the scissors or knife. The pain is usually most severe where the greatest amount of bleeding has been, whether from the arch or base of tonsil. I have tried argyrol to combat infection, and protargol with indifferent success. Those on whom I have used nitrate of silver say it is quite painful; nevertheless it prevents the infection, though it leaves some pain.

DR. SHURLY:—I have just a word to say, and that is, we all meet these cases of very great soreness, out of all proportion to anything that seems explainable from the condition. I have always considered that the amount of pain was to a certain extent in proportion to the wounding of the pillars. A very simple procedure which I have found of very great relief to these patients has been the use of the ordinary douche. The gynecologist would not know how to get along without it, and yet the rhinologist and laryngologist practically makes but very little use of it in acute conditions. Everybody has a douche bag, and it can be operated by the patient in the sitting position, and by putting in borax or boracic acid, or any of the simple cleansing salts we can put that douche quite into the cavity where the tonsil has been, or we can use it in quinsy and acute tonsillitis. Many patients will find very great relief from a direct hot douche right into the throat, which can be continued from five to ten minutes.

DR. MINOR:—It is interesting to hear Dr. Pinchon's paper. I have nothing new to offer. I was an early advocate of tonsillectomy instead of tonsillotomy, and being chairman of the Nurses' Training School at St. Mary's Hospital, Detroit, I personally inspected every applicant to the training school, and we had a great deal of trouble by our nurses becoming infected and having tonsillitis. So that every applicant who had any tonsillar tissue was subjected to a tonsillectomy, and our early experience was somewhat disastrous, because quite a few of the nurses complained of having so much pain after the operation, and some of them had more throat trouble after the operation than they had before, so that we had quite a rebellion, and one of the older nurses objected to our doing this work. Well, that set us to thinking—made us review our early work-and I want to say that it was very poor. For some reason or other I could not accustom myself to the Robertson scissor. I think I, as well as my confrères, did some pretty bad work. Now, I admit that following my operations there in the clinic little or no postoperative treatment was given, simply having the patient gargle with a 15 to 25 per cent. solution of hydrogen peroxid for three or four days. So that when this condition arose I examined every case I had operated on, and I found there were valid reasons for the objection on the part of the nurses. I found adhesions of the anterior and posterior pillars, new tissues between the pillars, more or less cicatrices, but mostly I think the trouble was due to the adhesions between the anterior and posterior pillars, preventing proper mobility, and perhaps enclosure of some of the nerve filaments in the scars. After correcting this the pain disappeared.

Dr. SPOHN:-I always enjoy Dr. Pynchon's papers on the tonsil. Those who have seen his work know that he has good results. Some may censure him for the pain he causes, but I can not when I hear the reports of his patients. One speaker mentioned the irrigation method in tonsil wounds. I believe this is dangerous. The hot water is liable to carry the infection into the system. We can take the clue from the abdominal surgeon. Formerly the abdomen was irrigated after operations, but it was found that better results are attained by the simpler methods of dry dressings, or as near to this as possible. In tonsil work the benefit of a hospital can not always be had. The large majority of cases return to their homes after the operation and are not seen for from two to eight days. We must depend upon the efforts of the patients to carry out our directions. As stated before, the irrigation is liable to carry the infection into the system. It is not an uncommon thing to find after the irrigation of a wound that a chill and fever follows. Even in cases of tonsillitis, the repeated use of the hot water irrigation, though agreeable to the patient. very often leads to attacks of rheumatism. I know of a physician who made it a rule to irrigate every case of tonsillitis. As he stated, it gave relief of the throat symptoms, but very often general systemic symptoms appeared. He abandoned this method of handling inflamed tonsils and applied the ordinary iodin preparations quite frequently, and since then he has fewer rheumatic cases and much less trouble in his tonsillar cases.

The suggestions made by the essayist, as to the applications of antisepties and the directions to patients how to use these applications, is to be commended. I like the iodin and glycerin application, because of the exosmotic action of the glycerin.

Dr. Pynchon (closing the discussion):-I will say that in my paper I did not consider the matter of hemorrhage, and was only considering the feature of ordinary after-treatment. Of course, we meet with hemorrhage occasionally that requires special treatment. For some reason or other I have observed that when there is moderate hemorrhage at the time of operation it diminishes the amount of soreness afterwards. After cautery dissection I always use nitrate of silver, providing there is no particular hemorrhage. After hemorrhage there is no need to apply it. In cutting operations there is always a pronounced hemorrhage-too much hemorrhage to apply silver. I have had just as much soreness after cutting operations without nitrate of silver as I have had after cautery dissections with nitrate of silver, consequently I disclaim the theory that nitrate of silver is any factor in the production of soreness. As regards serious complications after my cautery dissection operations, or other tonsil work, I have never had any trouble of importance. I have had pain in the ear-I do not remember of having had an otitis media, and I certainly have had no brain complications. As regards argyrol, I have but rarely used it. I have used silver in preference. Now, as regards pain. It always amuses me to hear various speakers get up and talk in a learned way about the great pain produced by wounding the pillars. I claim that this does not add anything to the soreness at all. There is, though, an explanation why some may get soreness from wounding the pillars. In olden times the general surgeon, in operating for appendicitis, cut directly through the muscles, and there was therefore a great deal of soreness because he cut the muscles crosswise, so during the process of healing there was stretching of the nerves, which caused all kinds of pain. Now he cuts according to the course of the muscle, and the result is that the wound heals without much pain. The same thing occurs in tonsil operations. parallel with the muscle fibers you will not get any pain, but if you nick in and cut those fibers crosswise you are sure to have pain. As regards

the use of the hot douche, I may have used it in the past, but I do not remember it, that is, after tonsil operations. I use it frequently in nasal operations where the bone is involved. As regards this matter of after-treatment, one of the doctors thought that up until three or four years ago nothing but simple gargles were used. I will say that I have used this iron massage for about twenty years pretty much as I use it now, and in none of my cases, where I have seen the patients through, have I ever known of any inconvenience. I always give my patients a printed sheet of directions. As regards rheumatism, I have never known of any case where rheumatism developed after tonsil operation; on the contrary, I have known a good many cases where the attacks of rheumatism were discontinued after the tonsils had been thoroughly and radically removed.

PRIMARY (?) MASTOIDITIS, WITH NOTES OF AN ILLUSTRATIVE CASE.

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The case to which I shall presently refer was the occasion of inquiry among colleagues as well as some review of the literature, and the result was the discovery that the condition known as primary mastoiditis had received on the whole a rather uncertain recognition. One of the obstacles to more systematic discussion has no doubt been the fact that common usage has given sanction to a rather broad application of the term, viz., suppuration or possibly sclerosing inflammation in the mastoid cavity without recognizable suppuration in the tympanum or external canal. varied explanations of its occurrence may also be a factor. Gorham Bacon, for instance, says: "It may be due to cold, trauma, syphilis, tuberculosis, influenza, or it may be spontaneous." Gradle suggests, "osteomyelitis"; and Blake adds, "otitis externa, diffused or circumscribed." With such a wealth of etiology it is not surprising that there should be uncertainty about classification. situation is sufficiently complex if we accept only trauma, syphilis. tuberculosis, osteomyelitis, and spontaneous; but when it is an extension of an infection through the tympanum (as from influenza), or the external canal (as from diffuse or circumscribed dermo-periostitis), the process is manifestly secondary, no matter how significant the initial features.

Against osteomyelitic and spontaneous origin, however, Politzer argues that the former would be more likely in denser bone, and the latter must depend upon hematogenous immigration, which is not yet proven. All writers agree that the disease is rare—supposedly under any circumstances. Barnhill estimates it as not exceeding 1 per cent.; but when he adds, "mostly due to trauma," even this low estimate seems excessive. Some otologists of large experience have seen as few as one or two cases.

As to the conditions—the areas involved—Blake's findings have not been disputed. These are in order: (a) The cells immediately below and in front of the antrum, with a probable sequestrum of outer margin of postcanal wall when associated with external otitis; (b) the cells at the tip; (c) the vertical cells along the posterior border; (d) the supra antral cells just under the tegmen.

For the diagnosis some dependence must naturally be placed on the probable etiology, and some on general conditions. Exploratory opening will have to do the rest, and may be the larger part. If one can believe that infection may pass from the nasopharynx "rapidly," as Blakely suggests, it is still difficult to believe that it can do so without causing at least some disturbance of function. In this event, too, the antrum would have to be the starting point, and this is the area which Blake does not particularly mention.

Likewise when the infection comes from the external canal we should expect the mark or history of trauma. Mastoid periostitis, or subperiosteal abscess, which might result from trauma to the canal, might, as we can see, serve as impenetrable masks; but these would not add to our difficulties because they give excuse for full inspection of the underlying bone.

In those cases, however, with absolutely normal hearing and no distinguishing marks in drum or canal, we must depend on circumstantial evidence to justify exploratory opening; and pain, of course, demands our first consideration.

Fulton, in a paper before the Otological Section of the Tenth International Medical Congress, spoke of a peculiar pain, "stinging, tearing, throbbing, persistent and radiating, destroying sleep and appetite," upon which alone, in two cases, he had correctly based this diagnosis. Operation revealed a pus cavity in one, sclerosing bone in the other, and both were thus permanently relieved.

But of those who discussed this paper not one could endorse the view that pain alone would warrant such a conclusion. Under the lead of Rossi and Baratoux I had the courage to relate that in a very similar case such a diagnosis would have been erroneous, because the extraction of a slightly decayed but quiet tooth (against the dentist's protest) brought complete relief. To this I can now add another, more unusual, which proved to be an idiosyncracy for K I, given in a case of "Bell's palsy." As a confirmation test, the resumption of the K I after a week brought back the mastoid pain. The K I was then abandoned and the pain left to return no more.

But however it was received when promulgated twenty years ago Fulton's idea was not without merit. Not only did he show results, but incidentally his case of sclerosing disease demonstrated the real importance of pain as a factor. From auscultation, transillumination, the leucocyte count, and the tuberculin reaction, had they been as now at his command, he might have had support in

his pus case; but hardly in the other. It is only essential that the pain can be accounted for in no other way.

Finally, as to the scope of the operation: That primary mastoiditis will furnish anomalous conditions is the expectation, rather than otherwise, and the question is whether we, on account of these conditions, may safely modify the procedure we count best for mastoiditis consecutive to drum abscess. But perhaps the notes of my case will put this before you more succinctly:

The patient, whom I saw in consultation with my colleague, Dr. C. P. Frantz, early in January of this year, was a married woman of 54 years, well nourished and never ailing until now. A sister had died of acute tuberculosis. Nothing else in the family history. She had had no previous earache or ear discharge at any time, nor had the hearing been noticeably affected. She had fallen from a step-ladder two years ago and bumped the right side of her head, but nothing came of it to speak of after the first few days. About six weeks ago she discovered a "mass of wax" in the right ear and had the family physician take it out. The removal of this "wax" hurt her very much and caused the ear to bleed freely. For the past five weeks she has had constantly increasing tenderness, pain and swelling back of this ear.

Conditions were as follows: Great swelling and tenderness above, below and back of the auricle, as far as the occipital protuberance; the auricle pushed forward and the canal narrowed so that the smallest speculum is introduced with difficulty; the memb. tymp. not discolored; and hearing as 1 to 5 when compared with the other ear.

My diagnosis was subperiosteal abscess—possibly mastoiditis as well, to be determined when the bone was uncovered. Advice, immediate operation. At the request of my colleague I operated, making the usual long curvilinear incision. Pus followed freely when the knife penetrated the periosteum at the level of the canal and continued to flow after the incision was completed-maybe an ounce in all. Wyeth's cross-cut was then made and the bone bared. Immediately back of the meatus and of similar diameters was a perforation of the cortex, through which, when the protruding granulations had been swept away by the finger, pus flowed without pulsation. The probe revealed a large cavity, and when the rongeur had removed the overhanging cortex, I had a wide trench reaching from the tip almost to the temporal ridge. Granulations were abundant, but when I had scraped the cavity clean and had everywhere smooth bone of good color I found I had no communication with the aditus, as I had expected from the location of the opening, directly up from and close to the meatus, from which it was separated by a thin lip of bone. While searching with a probe up and forward for the antrum a portion of this lip-roughly, 3 mm. square—gave way with a touch and was lifted out with forceps. It was manifestly a sequestrum. The probe failed to find any antral opening, and, right or wrong, I decided not to force one; so packed and closed the wound. A slow but uneventful healing followed. The patient was seen again five months later. There was a firm scar, slightly depressed at the upper end, which was last to heal; the hearing was not improved; the canal was wide and devoid of cerumen; and the m. t. was suggestive of chronic aural catarrh—too much color over the malleus and around the ring. She considered herself well, but said that the scar was tender.

Two problems are presented, viz.:

- 1. Was it a necrosis from without inward?
- 2. Should the antrum have been opened?

I have not been able to formulate answers satisfactory to myself, but the answer to 2 seems to depend somewhat on the answer to 1. Taking the prima facie case, the answer to 1 may be in the affirmative, because the prior rough handling could have caused periositis and this in turn erosion with the resulting sequestrum as mentioned by Blake. But the mass of wax removed might also have been in part detritus from some old and forgotten inflammation which involved the drum and left no appreciable scar. A pin hole perforation at the margin would meet these requirements.

Taking in like manner the prima facie case, the answer to 2 can be in the negative because on the assumption that the necrosis was from without inward, a walled off antrum would be a protection to the apparently uninfected drum. Besides this there is the proposition laid down by Cott in his paper before this academy two years ago that the antrum need not be opened even in cases of known drum infection provided the drum has ceased to suppurate. And the result is also to be considered. But on the other hand, I do not like it that the scar remains tender, the drum does not look right and the hearing does not improve. These seem to point to error somewhere in my prima facie conception of the case. The Calmette test was applied with negative results; but, I regret to say, no microscopic examination of the pus was made.

All in all, whichever answers are correct, I doubt if such cases can be properly classified as primary mastoiditis. Strictly speaking, the term should be limited to those resulting directly from trauma, and those cases extremely rare, of tuberculous and syphilitic degeneration.

DISCUSSION.

Dr. Stucky:—I am very much interested in Dr. Young's case because I have had three similar ones, and I believe I have learned my lesson; and that is, the danger of not opening the antrum whenever you open the mastoid cells. Now it is possible that this infection—in the case reported by Dr. Young—may have been from without, within, it may have occurred when the membranous canal was ruptured in removing that impacted cerumen, and the infection got up under the periosteum and you got a

periosteal abscess. But I have seen-a good many of you, I suppose, have seen—a very marked infection of the mastoid cells and no visible inflanmation of the antrum or attic. In two cases that I have operated on 1 found all the mastoid cells either in the stage of red softening or necrosis with pus and softening, in which the drum was practically normal. I saw no reason for entering the middle ear; I saw no reason for going up through the antrum into the attic and making an opening clear through. I thought perhaps I would run the risk of infecting an uninfected area in the middle ear, with the same results that Dr. Young is passing through now. The patient has some pain in the middle ear and some deafness. In a year or two afterwards in those cases I have had to do a radical mastoid operation. I believe Dr. Young thinks now if he had it to do over he would go through the antrum and do a classical mastoid operation. It does not erpeal to me to just do part of the operation. Now, I do not know how we can have a primary mastoiditis, but yet we see it-infection of the mastoid cells without having previously had infection of the middle earbut in these grippe cases, where we have the influenza bacillus, in which there is a well marked mastoiditis, we often have a practically normal middle ear and drum membrane. Dr. Young did not tell us whether or not there was any discharge from the orifices of the Eustachian tubes.

Dr. Young:—There was nothing complained of, and no examination was ruade.

Dr. Monosmith:—I am interested in this subject because I have had a death in our own family from what we considered a primary mastoiditis two years ago: A lady, 50 years old, had a severe attack of grippe, and at the end of a week she was taken with violent headache. No symptoms whatever referable to the ear. In less than 24 hours she became dull, and in a little over 36 hours she died. She had never had a chronic ear trouble, and never had any trouble with her hearing. We held a postmortem and found a diffuse leptomeningitis, and in opening the mastoid found the cells full of pus; the drumhead and ossicles were intact, and as far as we could ascertain there was no pus in the antrum, although the autopsy was rather clumsily performed. In looking up the subject afterwards I was unable to find any authentic cases of primary mastoiditis that seemed to be as clear as this, and I made up my mind there must have been a middle ear infection, although we were unable to find it at the time.

DR. Andrews:—I am not prepared with the data, but I recall at least a half dozen cases in my practice of apparent primary mastoiditis. I do not, however, believe that a single one was primary mastoiditis. I believe that every one was an extension of infection through the Eustachian tube, the middle ear, the attic, the antrum, to the mastoid. Now, I have no positive evidence of this, but it is so much easier for infection to reach the mastoid in that way than in any other, that I think it is very unsafe to assume that we have a strictly primary mastoiditis. It would be possible, of course, because we have primary infection of the bone cells in other parts of the body, but it is so much easier for infection to reach the mastoid in other ways that I believe a primary mastoiditis is exceedingly rare.

DR. MURPHY:—I am inclined to think, as Dr. Stucky has expressed it here, that Dr. Young's case was one of infection rather than of primary mastoiditis, no doubt due to the trauma produced during the removal of inspissated cerumen, and the infection was carried in along that line. I had a case last year of a seven months old child with a mastoiditis, on the right side, without any discharge, and requiring operation. Three weeks later, without any discharge or any symptoms of middle ear trouble, the child developed a mastoiditis on the left side, so

that this side had to be operated on also. I have no doubt the infection was along the channels discussed by Dr. Andrews, beginning down the Eustachian tube on the right side, and up the Eustachian tube on the left, out through the middle ear into the mastoid under the periosteum. Of course, in a child of this age there are no mastoid cells to speak of, but I am satisfied in my own mind that the infection was probably along that route.

Dr. Dean:—Some four months ago I operated on a case of so-called primary mastoiditis in a girl that was very much emaciated. During the operation the antrum and the tympanic cavity were not found to be involved. After the operation the patient made a nice recovery, so far as the mastoid bone was concerned, but her general condition grew rapidly worse, and a few weeks ago she died of acute miliary tuberculosis.

The second case I operated on some time during the winter, which I think is a nice case to illustrate the point that Dr. Andrews made. This patient gave the history of pain developing back of the ear during an attack of acute tonsillitis, with no interference with hearing. The physician that had her in charge at the time was a very good man. He told me at that time he could see no sign of any change in the drumhead. Some months later the patient had a diagnosis of functional otalgia made. When I saw her for the first time she had a temperature of 104° and was unconscious. I operated on her and found a mastoiditis with pachymeningitis. There was no involvement of the antrum or tampanic cavity. It seems to me the infection must have extended up along the Eustachian tube through the tympanic cavity into the mastoid, but still there was no involvement of the tympanic cavity, so far as I could see.

Dr. Shambaugh:—In regard to the etiology of these cases of primary mastoiditis we should all be willing to concede that a primary suppuration of the mastoid process may occur just as a primary bone disease in any other part of the body, from such diseases as syphilis, tuberculosis, etc. On the other hand, whether it is possible for the pneumatic spaces of the mastoid process to become the seat of an inflammatory disease independent of an infection in the tympanum is another question. In this connection I would like to call attention to the work which was done by Professor Bezold some years ago in connection with the occurrence of inflammation in the tympanic cavity in scarlet fever. In examining a number of cases where this disease had resulted fatally, Bezold was able to find evidence of an inflammation in the tympanic cavity which was not associated with any inflammatory reactions in the Eustachian tube. All these cases being acute, he interpreted the absence of the inflammation in the tube as signifying that the infection in the tympanic cavity had not extended by contiguity from the throat to the tympanum, but that the inflammation in the tympanum was carried there, perhaps, through the circulation. If an infection may spread from the throat to the tympanum without producing any reaction in the tube it seems quite probable that a similar inflammation may be set up in the mastoid cells without producing a reaction in the tube or in the tympanum.

There is another possible explanation for these cases of primary mastoiditis, and that is, that the germs producing the inflammation have actually passed through the tube into the tympanum, and from this through the antrum, without producing any reaction. When they finally reach the mastoid cells they, for the first time, become actively virulent. We know, for example, that virulent microbes are often found on the mucous membrane of the nose and throat without there being any evidences of their having produced any reaction. Some unfavorable disturb-

ance, such as exhaustion or exposure to cold, permits these germs to become active.

It seems quite possible that bacteria may spread through the tube, tympanum and antrum, producing no reaction in these parts, and yet, when they finally enter the mastoid cells, the conditions there may be such as to permit of their becoming active. The membrane lining these mastoid cells is not as perfectly nourished as the membrane lining the tympanum or the tube.

The question has been raised in this discussion as to whether one should open the antrum in all of these cases of apparent primary mastoiditis. I can hardly imagine a situation where an inflammation in the tympanic cavity—and in this term we must include the antrum, which is really part of the tympanum—can exist without our being able to diagnose it from examination of the drum membrane and catheterization of the tube. If one finds, upon a careful examination of this sort, that the tympanum is not involved in the inflammatory process, I can see no reason why one should think it necessary, in opening a primary mastoid abscess, to make an opening into the antrum.

The past year I have seen several cases where the inflammation in the tympanum subsided and remained quiescent for a number of months, and where the infection in the mastoid cells continued in a more or less latent form, but finally produced symptoms which called for an opening of the mastoid. In both of these cases a circumscribed abscess of the mastoid process was found, with no evidence of communication with the antrum. No opening was made into the antrum, and both cases resulted in a very rapid cure.

DR. HOLINGER:-Dr. Young made a question mark after the title of his paper, and I think he was right. He told us that the patient did not hear well and does not hear now. He did not tell us whether he catheterized the tube and what the outcome of the auscultation was-whether there was any fluid. I must have forgotten if he did say so. This would settle the question of primary mastoiditis. Why should we have a deafness in the middle ear unless the middle ear itself is involved? The other thing is the form of deafness. Was it a middle ear deafness or was it a labyrinthine deafness? The tuning fork would give clear information. If it was a middle ear deafness there was hardly any possibility to mistake it. It would decidedly point to an infection there. Now, as to the possibility of the mastoid itself being infected from a trauma in the external meatus, I do not think that is remote at all, especially as the Doctor says there was a sequestrum quite close to the place where the injury occurred. Still I do not think he ought to have avoided going into the antrum. think we ought to open the antrum in almost every case. It does not complicate the operation and does not increase the duration of healing. Uncomplicated cases only take about two weeks for curing, and I do not think anybody can show a shorter time of healing, even if he does not open up the antrum, unless it is by Dr. Bryant's blood clot method, in which only a week is necessary for recovery, but I understand there are quite a few objections offered to that.

Dr. Sturb:—The question of primary mastoiditis is something like the question of primary laryngitis of tubercular origin. If we have a tubercular laryngitis, and it is not possible to demonstrate that we have tubercular lungs, there is always a lingering suspicion that it has been overlooked. It is the same with primary mastoiditis, and even if there has been infection which has extended up through the tube to the middle ear cavity, if before the operation we can exclude the necessity of intervention as regards the opening of the membrana tympana, it seems

to me that the operator is called upon to treat the mastoiditis which is present. It is very frequent that we see a case which comes to us immediately upon having some aural disturbance, in which there is a small area of reddening in the upper part of the membrane, and ultimately that will extend lower and lower, and in the early stages we are able to demonstrate the absence of fluid in the middle ear. I believe it is now accepted that we can have an abscess of Prussak's space without any other part of the middle ear cavity being involved, and for that reason we would only make a free incision in Prussak's space. It is the same with an operation on the mastoid. While I would not lay it down as a rule, yet I have observed quite a number of cases where we have a free discharge from the middle ear cavity which ceases upon the beginning of the mastoiditis; we have a localized collection of pus, in which the collection in the mastoid cells has been shut off by swelling from the antrum and attic, and in these cases where I have simply opened up and cleared out the cells, without opening the antrum, the case got well at once. In other cases where we have a mastoiditis with a continuation of the discharge from the tympanic cavity, we generally find a connection between the mastoid abscess and the antrum. In those cases it seems necessary to me to expose the antrum. I do not think it is right to lay down the rule to open the antrum in all cases, for in many cases we find the trouble clears up without exposure of the antrum. Another word: I assume that Dr. Stucky's case had no discharge from the middle ear cavity, because he compared it so closely to Dr. Young's. That being the case, I think the indications for radical mastoid operation were somewhat confused. We see in the literature every day, and we are hearing discussions and the free use of the term "radical mastoid operation," and we know of radical mastoid operations being done day after day without adequate indications for the same. I do not believe in this case that he refers to—there was no discharge from the middle ear cavity-that he would be warranted in doing the radical mastoid operation, the simple operation being indicated.

DR. YOUNG (closing the discussion):-I am pleased with the discussion from the members of the Academy; that is what I came for. In the paper you will find the arguments which induced my conclusions. As Dr. Stucky says, I practically regret at the present time not having opened the antrum. Of course, one gets a different view five months after the operation from what one had five hours before. A part of this examination I presumed had been made by the colleague to whom the case was originally brought, but I found afterwards that these details were not forthcoming. However, the amount of loss of hearing which was present in this case, it seems to me, could be accounted for by the tremendous narrowing of the canal. Only the smallest speculum in my possession could be introduced at all, and that with difficulty, and so I could only see the drum in general and nothing characteristic of any trouble. This, in connection with the history that she never had any ear trouble in her life, seemed to me a possible explanation of the situation. The object of my paper, as I indicated by the title, was two-fold: First, what we should call primary mastoiditis; and it is because of the confusing things we see in the case I have cited that I think we ought to be more strict in our classification, and limit that term to the process which we can reasonably know beforehand is a primary inflammation-trauma, systemic poisons from tuberculosis and syphilis; possibly osteomyelitis. As to what should be done in the light of the result? Of course, we all aim to get a cure. I can not say that I accept the doctrine which I use as an argument for my course that an antrum should not be opened when there is a reasonable belief that the antrum has not been infected. I know it has very good support.

Politzer himself has made use of that practice, and Dr. Shambaugh thoroughly endorses it in certain cases, and various other men in whom we place confidence. Now I feel a little question in my own mind whether the risk of opening the antrum in such cases was to be more dreaded than the failure to open it.

One question which I raised was not spoken of, and that was the fact that I did not see the plug removed from the external canal. I called your attention to the fact that plug of supposed cerumen might not all have been cerumen—it had been removed six weeks before. We might have found the detritus of some old inflammation which would give us an explanation of the true etiology of this affection. I am pleased to have radical expression from the members as to the radical operation, although I realize that the radical operation has sometimes not given the result when we come to use the term "cure," that we would like. I have on my records now five cases of spontaneous tympano-mastoid exenteration, and only one of those at the present time is not needing my systematic help. That one is under the ground. So that some of us who do not approve of this radical operation so very thoroughly feel that we have some excuse for limiting our operative procedure. Not a great while ago I had a letter from my colleague, Dr. C. M. Hobby, in which he expressed himself on the question of radical mastoid operation, and he said just this: "In looking over the records of my many cases of mastoid operation I practically have no regret at not having made, in the majority of cases, a typical exenteration. I have found that where I cleared out practically the bulk of the necrotic tissue and exposed the cavity to atmospheric air my cure was satisfactory."

These questions are all before us, and I brought them here because I think that in the ordinary works of reference and the literature we can not get anything definite about it, and, as I said in the opening of my remarks, I am very grateful to the Academy for its expression on the subject.

GRANULOMA OF THE TRACHEA, WITH REPORT OF A CASE.

HAL FOSTER, M.D. KANSAS CITY, MO.

During the last five years, I have been called upon to treat several cases of granuloma of the trachea. Jan. 7, 1903, Drs. Mann and Perry, of Oak Grove, referred a boy, aged 4 years, to me. History: Two months prior to my seeing the case, he was taken dangerously ill with laryngeal diphtheria. The membrane extended low down into the trachea. To save the boy's life the doctors made a low tracheotomy and administered antitoxin in full doses. He was quite ill, but in about four weeks made a good recovery. It was noticed upon removing the tube from the trachea the patient would very soon have great difficulty in breathing. In fact, if the tube was allowed to remain out longer than two hours he would suffocate. On one occasion the boy came nearly dying for air before Dr. Mann could reinsert the tube. I took the tube out of the trachea while making the examination. Respiration was so extremely difficult that it was absolutely necessary to rapidly reinsert it. An intubation tube in the larvnx did not aid in the least in giving the boy air. Jan. 8, 1903, under ether anesthesia, I reopened the trachea. Granuloma were found both below and above the original wound. These were very carefully dissected out, the edges of the old wound were cut away, a very small tube was inserted and the wound above and below was touched with a silver solution and closed by sutures. On the third day the tube was removed. Iodin and menthol in oil were used in a nebulizer. The wound was now entirely closed by adhesive plaster. Syr. iodid of iron was administered. The patient was made to blow a few soap bubbles three times a day. This was done to strengthen the vocal cords. The little boy left the hospital in four weeks, entirely well. He breathed freely through the mouth and larynx. May, 1908, the boy is about as well as any boy of his age.

REMARKS.

These growths were not papilloma but granuloma. It is well to remember this complication might arise whenever the tube is allowed to remain too long in the trachea. It seems three or four days or a week is long enough to leave the tube in the trachea in these acute cases, in order that we might not have this dangerous, hard to treat and distressing complication.

DISCUSSION.

Dr. Shurly:-To me there is no more interesting work and nervewearing work than the story of a retained intubation tube or a retained tracheal canula. In the course of more than 500 intubations and a large number of tracheotomies this unfortunate disaster has occurred to me some twelve or fifteen times. The pathological conditions that are found in the trachea with these retained tubes are of different varieties and are exceedingly interesting. It was my privilege some years ago to thoroughly go over the literature in this regard and to look up and enumerate all the different causes that led to these conditions. The late Dr. O'Dwyer, who contributed so much along this line of work, tried, in the last two or three cases before his death, the application of gelatin-coated tubes, upon which was placed different medicaments; first alum solution. Ichthyol and argyrol also can be used in that way. Carrying out this idea, I made use of this method of medicating the larynx, and where we have the erosions and papillomata and granulomata that result from some traumatism in the larynx-where this case was of traumatic origin originally-we found those tubes could be removed in every instance. In fact, those twelve or fifteen cases all recovered where we made use of this method. Alum and vaselin can be used if you are replacing one of these tubes in a hurry and can not go through the proper procedure of making a gelatin mixture. Where the applications are made in this manner and smaller tubes are gradually inserted, I found very little difficulty in getting all these patients well. In fact, twelve or fifteen of them recovered after this method of treatment.

DR. BROWN:—I had an interesting case under my care more or less for ten years, probably, in which the tracheal tube was inserted, and I am sorry to say the tracheal tube is still in use. On two or three occasions I found those same granulomata of which Dr. Foster has spoken had become developed to such an extent that the child was unable to wear the tube and I had to remove them.

Dr. Holinger:-There was a very extensive and thorough investigation published in the Cor.-Bl. f. schweiz. Aerzte on this subject about five or six years ago, in which the author says that about 3 per cent, of all the cases of intubation and tracheotomy will develop granuloma. What granuloma is due to, is very hard to say. The writer of the paper mentioned comes to the conclusion that it is much more of a personal predisposition to granuloma than anything else. All kinds of means were tried to avoid them. The tube has been changed in form and width so that no decubitus should occur. Many different medications have been tried. One point has been brought forth: never leave the tube in longer than absolutely necessary, say not longer than 24 hours. Forty-eight hours is an exception. Of course, it means an enormous lot of patience. You have to sit for hours at the bedside and watch every breath, and as soon as there are dangerous symptoms you must be ready. Even in those cases where it is absolutely necessary to leave the tube for weeks, it is advisable to remove it for several hours each day. In this way we may keep down the granulations and prevent the occurrence later on of granuloma. The late consequence of these granulations should not be forgotten. They are all kinds of scars, strictures and alhesions which often call for secondary operations.

Dr. Hal Foster (closing the discussion):—I have very little to add. I have studied under Dr. O'Dwyer and did intubation a great deal, but I have never had this trouble with the cases I have been called on to intubate, had that trouble that one of the doctors speaks of, but I have seen it with the tracheotomy tubes. I tried in this little patient a small tube and was soon able to cure him in the same manner that Dr. Shurly speaks of. I still think with these cases of acute diphtheria it is not safe to leave the tube in for more than two to three days at the outside. If you do leave them in longer, you are bound to have these cases of granuloma, and they are very hard to cure.

ABSCESS OF INFERIOR TURBINAL, WITH REPORT OF A CASE.

KATE W. BALDWIN, M.D. PHILADELPHIA, PA.

The case which I report to-day is unique in my observation and I have not seen one recorded. I report it because it is so unusual, hoping to elicit discussion and gain information.

Miss S., a trained nurse, about 30 years of age, tall and well developed, whose usual weight is 145 to 150 pounds, first consulted me in the fall of 1902. At that time she had pain in teeth, gums, throat and right ear. She traced no symptoms to the nose.

Examination showed marked gingivitis and an impacted wisdom tooth—right upper. The right ear was normal, except for some thickening and retraction of the drum membrane. The left nasal fossa was very free. The septum was badly deflected to the right, with a heavy ridge at the base, terminating in a sharp spur, which pinned the right inferior turbinal to the outer wall. There was no satisfactory view of the right middle turbinal. The right fossa was completely obstructed, except for a small space along the floor under the ridge, which showed only after the application of cocain and adrenalin chlorid. There was no secretion in the left fossa, but a heavy mucus in the right. I advised the correction of the septum deformity, but the patient did not think best to have it at that time. The wisdom tooth was freed and came through without further trouble.

In 1905 it was quite generally thought that Miss S. had tuberculosis. At no time could I find any lung lesion, but the cough and secretion were accounted for by the condition of the upper air passages.

Some time in 1905 I urged the nasal operation, fearing that at any time a septic sinuitis would cause much suffering and do damage not easily overcome. About this time Miss S. was on several septic cases, one very bad case of diphtheria. She herself was impressed with the idea that she had tuberculosis. The sputum showed streptococci, but no tubercle bacilli. Miss S. was offered the position of supervising nurse in a small private sanatorium for tuberculosis, which she accepted for a few months, as the work was light and the food and air good. Milk and eggs were forced and she went up to 160 pounds, but in March, 1906, developed a very severe septic frontal sinuitis. The pain was extreme and the poor drainage complicated treatment and delayed recovery. She remarked that she remembered what I told her of the dangers, but had not believed my prognosis would so soon be proven true.

In May, 1906, I did a submucous resection of the nasal septum with the hope that it would give sufficient room. The right middle turbinal was large and boggy and did not to any extent recover itself after the septum operation. In June I removed the turbinal and a large polyp, which came down from an ethmoid cell. The cough continued through the summer and she was not in good condition. Miss S. left the sanatorium and took charge of a day nursery in Philadelphia. While there she had an ischio-rectal abscess and much of the time was far from well. From here she went to Atlantic City to do private nursing and get the benefit of the sea air.

Miss S. reported early in November, 1907. Had had some treatment during the summer. She could at times breathe quite freely through the right side of nose. There was no more headache and the pain in the eye did not return after the removal of the middle turbinal. The ear was giving no more symptoms. The teeth had all been put in good condition; still there was more or less pus in the right side of the nose. I contracted the soft tissues as completely as possible and anesthetized the parts. At all times she had been hypersensitive and work on the nose under local anesthesia was very difficult. The tissues all contracted except the posterior half of the right inferior turbinal. In my search for pus I pretty well eliminated the frontal and lateral sinuses and the sphenoid. After waiting a few minutes there was a little line of pus on the inferior turbinal which was not traceable to the sinuses. Accidental pressure on the inferior turbinal made the pus well up through a very small opening in its upper border. With a small bent probe I entered a large cavity, and with a sharp knife made a free opening and as the pus was evacuated the turbinal collapsed, the fossa opening up as it never had done before. It was washed with normal saline solution and thoroughly disinfected with crystals of argyrol for five or six days and the patient returned to Atlantic City. I saw her the first of July, 1908. All symptoms had disappeared. The general condition was good, there had been practically no pus after the abscess was opened in November and she was with comfort attending to the regular duties of her profession.

During all this period there had been much difficulty in getting glasses which could be used with satisfaction, and close work was almost entirely abandoned. Now her correction holds and she gives no thought to the use of her eye.

I am inclined to believe that the septum was the primary cause of all the trouble, it causing the obstruction and the degeneration of the turbinals, which combination prevented proper drainage. Hard work with septic cases was sufficient exciting cause. Why should the posterior half of the turbinal have been the seat of the abscess after all other conditions were better, or was it present all the time? At no time was there any lung involvement, but such nasal conditions predispose to tubercular infection many a case which would never develop if the upper respiratory tract were kept in good condition.

DISCUSSION.

Dr. Shurly:—I would like to ask if the cough left after the abscess was opened, and if any exact bacteriological findings were made from it?

Dr. Baldwin:—The cough disappeared very promptly after that and the pus did also. The pus from the abscess was not examined bacteriologically, but previously the pus had shown streptococci.

FUNCTIONAL PARALYSIS OF THE ACOUSTIC NERVE.

F. GURNEY STUBBS, A.M., M.D. CHICAGO.

While we have comparatively little difficulty in separating diseases of the sound-conducting from the sound-perceiving apparatus, we are confronted with much uncertainty in classifying the diseases of the sound-perceiving apparatus. In line with other nerves of the body, special and otherwise, there is both an organic and functional affection possible of the acoustic nerve. Of the latter form of paralysis there will always remain a few manifestations, although as our pathological knowledge has increased we have found a definite organic change in many conditions that were at one time styled functional.

In keeping with the classification of functional nerve paralysis there appear to be three forms of acoustic nerve paralysis: (1) angioneurotic, (2) rheumatic, and (3) hysterical.

The angioneurotic form of functional acoustic paralysis is extremely rare and is probably closely associated with the sympathetic nervous system. It manifests itself in one or more attacks, each one lasting only a few minutes. They begin suddenly, with pallor of the face, ringing of the ears, dizziness, nausea, vomiting and hardness of hearing, last a few minutes and disappear with return of the normal color to the face. Urbantschitch has observed cases of tinnitus and hardness of hearing with accompanying severe pulsation of the carotid and marked reddening of same side of face, neck and auricle and refers them to a vasomotor disturbance of the sympathetic, a spasm of the vessels in the region of the acoustic center, similar to the hyperesthesia or anesthesia which frequently is present in migraine or the deafness which is seen following fright.

The galvanic current applied to the sympathetic of the neck is the only indicated treatment and in the cases reported has been efficient.

The rheumatic form arises from cold, heat or in the course of other rheumatic manifestations. The paralysis may be of the acoustic nerve alone, or at the same time it may affect other nerves in close relationship with it, as the facial and trigeminus. When alone affected it is more difficult to diagnose. Its manifestations will vary, depending on whether the cochlear portion of the nerve

alone is involved or the vestibular also. In the former case the disturbance of hearing comes on in a few hours to days and may be moderate or extreme in degree. There is usually a marked tinnitus present. The tuning forks give the usual reactions for primary nerve deafness—lateralization from vertex toward the normal ear, positive Rinné, lost or shortened perception through the cranial bones and perception for the deep tones through air conduction. If the vestibular portion is also involved we have severe dizziness, disturbance of equilibrium, as an inability to stand with closed eyes or to walk straight, nausea and even vomiting.

The diagnosis must be made from the etiological factors such as exposure to cold or draught, presence of general or local rheumatism or gout, the course of the paralysis, and the complication with rheumatic paralyses of other cranial nerves if present.

The course of the disease shows a disappearance of the vestibular symptoms first, if present, while the restoration to normal hearing is slower. In a certain percentage of cases there will remain more or less permanent defect of hearing.

While nothing is known as yet as to the pathology, still it is believed there may be a neuritis present. Ogston has compared these attacks to those of glaucoma met with in arthritic patients.

Treatment seems to have no effect on the course of the manifestations, yet galvanization is to be employed in addition to a general rheumatic medication.

The hysterical form of paralysis of the acoustic nerve appears as an acute hypesthesia or anesthesia. It may share in an hysterical unilateral hypesthesia or anesthesia of the whole body, or as a neurosis localized to the organ of hearing. This last form is very rare, especially when it is bilateral.

It is very frequently observed that hysterical patients complain of peculiar sensations in the ear, such as a feeling of tickling, creeping or flowing in the deeper portions of the meatus, painful constriction and pressure in the ear, an increased sensibility to noises, without any disturbance of hearing. Hysterical otalgia, especially in the presence of actual auditory disturbances, is quite common. But all these manifestations are separate and apart from hysterical hypesthesia or anesthesia. There should not even be present timitus or attacks of dizziness. In fact, Hammerschlag regards them as a sure indication of organic affection, even in an hysterical individual. After examining a large number of cases of hysteria he found that a disturbance of hearing without any palpable change of the hearing apparatus constitutes a very constant symptom, and in spite of the variability of the manifestations there is a certain

sharply defined symptom picture; also that hysterical anesthesia is much more rare than hypesthesia. Further, he found, as Frankl von Hochwart had already pointed out, that in hysterical hemianesthesia the ear—when at all—is affected on the disturbed side, but also in slighter degree on the opposite side. This corresponds to the limitation of the field of vision in analogous cases.

The hemianesthesia manifests itself by tactile hypesthesia, hyposmia, limitation of the field of vision, and a diminished sensibility to thermic and painful irritations on the affected side.

The onset of the deafness, unilateral, seldom bilateral, may be sudden or gradual. The return of normal hearing may also be sudden or gradual, though the deafness may persist for many months, constant or with variations in degree.

The diagnosis rests upon the presence of other hysterical manifestations and the absolute incongruity of the various hearing tests. On the one hand the tuning forks give a reaction for primary nerve deafness, i. e., the bone conduction on the affected side is markedly reduced or lost, Weber goes to the unaffected ear, and Rinné is positive if the fork is heard at all by air. On the other hand, and this is the characteristic sign of hysterical hypesthesia, the voice and watch are heard disproportionately better than the fork, and in like manner better by air than bone. For example, by air conduction the fork may be heard one-eighth to one-fourth, while the whispered voice may be heard one-third to one-half of normal. Where the fork can not be heard by bone at all the watch may be heard by air conduction.

The lowering of the bone conduction would lead one to expect a greater shortening of the air conduction than one actually finds. Further, the inconsistency between the perception of the tuning fork tones by air and for speech is striking. The reduction of tuning fork tones by air bears no relation to the slightly reduced speech perception.

Hammerschlag has attempted to explain the fact that the air conduction is shortened for tuning fork tones over speech and calls it a "Fatigue Symptom." That it is due to an exaggerated fatigue of the acoustic nerve for tone irritation which is continuous and gradually diminishing in its intensity, such as tuning fork tones. The symptom is this: a fork of medium pitch is strongly struck and held before the ear; when no longer heard it is withdrawn for two or three seconds and returned to be again perceived. This may perhaps be repeated once or twice. Eitalberg claims that this symptom is diagnostic of organic acoustic nerve disease. I myself

have observed it in apparently normal cases as well as in diseases of the sound-conducting apparatus and am inclined to regard it as evidence of mental confusion and lack of concentration.

When there is a general paralysis of touch and sensation there is also anesthesia of the external ear, otherwise only a lowered sensitiveness. It is especially characteristic in either hypesthesia or anesthesia that there is an entire absence of symptoms of vestibular nerve portion. Only in hysterical patients with middle-ear trouble on one or both sides may it be present.

It is extremely rare to elicit the phenomenon of transference, but is also a positive symptom.

In the treatment the galvanic current, as in the other forms, is the most used. Hypnotism has given brilliant results in some cases, as might be expected in hysteria. Metallo-therapy and transference is only a form of suggestion and rarely is successful.

In case the deafness shares in the general manifestations, then more than ever must general as well as local therapeutic measures be carried out. General tonics and stimulating diet, massage, electricity in different forms, and finally suggestion and even hypnotism. At the same time the patient must have the daily life so arranged that either a change in habits or environment will assist in what might be called auto-suggestion.

As to local treatment, Gradenigo has called attention to the fact that when the patient has some slight palpable ear trouble and it is treated, with good results, the hysterical deafness will immediately clear up, but if the result of treatment is not at once good, then it will react as a psychical trauma and produce an increase of the deafness.

He also holds that those cases are hysterical which yield to electrical treatment and that this therapy is without results in actual anatomical lesions of the auditory apparatus.

The galvanic current is preferred and tolerably strong. The cathode is applied to the tragus, the anode to either the neck or the hand of the same side as the affected ear, the current is raised to 8 to 10 milliamperes, interrupted frequently, and the treatment should last from five to ten minutes.

Some authors recommend the static electricity, but apparently with no better results. The binding on the ear of a gold piece or pouring mercury into the meatus is not to be commended. It could only be employed on a densely ignorant and superstitious patient.

The following cases are reported as showing some of the manifold symptoms of the hysterical form as well as apparently one of the rarer manifestations of the angioneurotic form:

CASE 1.—Mrs. E. H., aged 37, widow. General health has always been fair, aside from attacks of headache during the last few years. Has had an hysterectomy six years ago. Heart, lungs and kidneys normal. March 6, 1908, went to New York to nurse a sister who was seriously sick with erysipelas and was greatly shocked on seeing her appearance—so much so that for two weeks she complained of feeling dizzy and of a queer feeling in head and a sensation of pressure on vertex. March 23, while eating dinner, suddenly complained of a feeling of impending death, fullness in head, face became intensely red, marked tinnitus aurium and dizziness, a sensation of an explosion in the head, followed by a feeling of water trickling down the outside of head. There was also nausea and vomiting. With this was deafness so marked that patient could not hear what was said for four or five minutes. She remained on a couch for about four hours and during this time the veins of the scalp and forehead were engorged and blue, and there was a livid appearance to lips and finger tips. For four or five days there was noticed a black and blue appearance of the scalp and there was present a hyperesthesia of same. No physician was called, but soon after was told by a trained nurse that she had had an attack of apoplexy and that she might lose her hearing if she had another attack.

On May 5, while wiping a hardwood floor, she experienced the same sensations in head as of something bursting, and lost consciousness. She was alone in the house at the time, but believes she was in this state for about three hours. On recovering consciousness she felt as though left side of head was dead and that there was a block set into side of head which prevented her hearing a thing on that side. Could see, smell and taste normally. There was no blueness of lips or discoloration of scalp as in first attack The deafness disappeared on the fourth day as though a wave passed over that side of the head and removed the obstruction to Since this second attack she has had three more in two months' time, but purely hysterical and confined to aural symptoms. These are all similar, each coming on suddenly as though a plug had been forced into the external canal. The deafness would last from thirty-six to forty-eight hours. The last one occurred while out driving, and it was after this one that I first saw the patient. It was the day following the onset.

There was hyperesthesia of the external canal of the left side; membrana tympana on both sides normal. Tubes freely open and no naso-pharyngitis present. Weber to right. Schwabach, R. normal, L. reduced. A.C., R. 40/40; L. 10/40. B.C., R. 20/40; L, 8/40. Whispered voice, R. 21 ft., L. 9 ft. Fatigue symptom present.

There were no general hysterical manifestations present. One week later hearing was normal to voice and forks.

I believe that his case can be considered one of angio-neurotic deafness as to the first two attacks, though not seen by either my-

self or any physician, and the latter ones purely hysterical, though the persisting deafness after the second is undoubtedly hysterical also.

Case 2.—Mary G., domestic, mulatto, aged 34, married, no children, no miscarriages, never been pregnant. About ten years ago she had an attack of la grippe, after which she became deaf in the left ear, a deafness which has persisted up to the present time. She never had any discharge from the ear, however, that she could remember.

For six or seven weeks preceding her appearance at the clinic she has been almost totally deaf. This deafness came on suddenly, unattended by discharge, after a spell of sickness during which she experienced considerable pain in the head. It followed soon after a dose of medicine prescribed for her by the attending physician. This medicine, she believes, caused her to become suddenly deaf. She also complains that the left ear has more roaring in it than it had before her present attack.

Examined with reference to her general condition, especially as regards her nervous system, the following statements were elicited as to previous history. She stated that she had always been somewhat delicate, tiring easily at work, and not very strong, but had never had any very long or exhausting illness, either acute or chronic. Some years ago after an illness of some days (she thought it must have been the grippe) she thought the room seemed dark one afternoon. She went to the window and raised the curtain only to discover that the trouble was with her eyes. She states that she became entirely blind, recovering her sight only after some weeks and very gradually. The family physician of the family in whose service she was at the time treated her throughout this illness and the ensuing blindness. She has had no trouble with her eyes since.

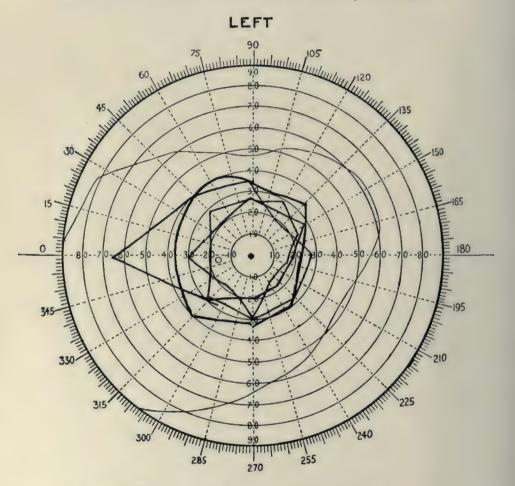
A member of her family stated in conversation that "she had nervous spells" and convulsive attacks brought on by overwork and worry on more than one occasion. The patient herself denied ever having had any such attacks.

Objectively, the patellar and other reflexes were normal. The throat was unusually excitable during the examination of the larynx and postnasal space. A general hyperesthesia of the cutaneous surface over the thorax and abdomen amounting to a complaint of pain on light pressure. There was tenderness on pressure over the lower cervical and dorsal portions of the spine. No hysterogenetic zones or anesthetic areas were found. The patient's subjective attitude was decidedly hypochondriacal.

There was limitation of the visual and color field as shown by the accompanying chart. Vision in either eye was 20/20. The addition of a combination of low plus spheres and cylinders gave her 20/15. The ophthalmoscope revealed a perfectly normal fundus.

Neither were there any signs of any previous diseases of the other coats of the eye or of the media.

Auditory findings: External ear normal in form and in tactile sensibility. Membrana tympana, R. normal, L. somewhat retracted and opaque. Eustachian tubes open on both sides. Voice sounds not heard in either ear. Fork tones not heard by air or bone in

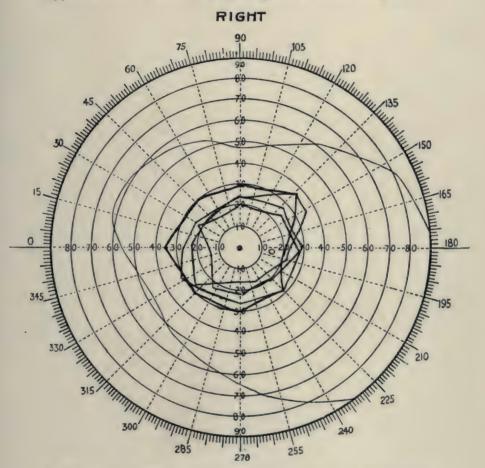


right ear. Weber to left. Schwabach, L. 7/40. Rinné, L. negative. The Galton whistle not heard at all.

She was under observation for four months, with irregular attendance, the last month of which galvanism was administered. During this month she had been professing to hear some, claiming first that she could hear an alarm clock when the alarm was in action and the clock held close to her ear. Then she reported being able to hear the conductor register his fares in the street cars. She

never acknowledged hearing any conversation, although apparently understanding or guessing at much that was said to her. She claimed during the last month of treatment to hear the C2 fork by air in both ears, but not by bone in the right.

The diagnosis of this case rests on: first, the history of hysterical attacks and the former hysterical amblyopia; the present general hyperesthesia of the trunk and the hysterical visual field; second.



the previously existing disease of the left ear as an unconscious mental suggestion for this form of hysterical manifestation, while the depressed state, mental and bodily, with the bitter medicine furnished the immediate cause of the attack (the physician's prescription was for the elix. of iron, quinin and strychnin, of which the patient took three doses); third, the absolute loss of tone perception in the right ear and the lessened perception in the other, with an entire absence of vestibular irritation symptoms.

The hyperesthesia of the body is contrary to the usual rule and is similar to a case recently reported by Thanisch.

Case 3.—Emily C., aged 37, married, two children. Family and previous history negative. Physique, tall, slender, fair complexion and of neurotic habit. Four years ago began to worry a great deal from family disturbances. Three years ago, following a blow on right shoulder, with a slow healing wound, first noticed a moderate degree of deafness which apparently would vary from time to time between the two ears. This condition continued for nearly a year. when she moved to Chicago. At this time she claims that she could hear perfectly. Six months later her husband deserted her and soon after her deafness returned. Conversational sounds were heard only as a whisper. Was treated by her family physician with nasal sprays and aural irrigation and after a time hearing improved. Was seen by me for first time some months after this, when the following conditions were present: Membrana tympana, both sides slightly opaque, no retraction. Tubes patulous, no nasal catarrh. Fork tests: Weber to right; Schwabach, R. diminished 5 seconds, L. diminished 8 seconds. Rinné, positive both ears. Watch heard. R. 24 in., L. 18 in. Whispered voice, R. 15 ft., L. 12 ft. In comparison, the fork was heard only 18/40 in R. and 10/40 in L. Fatigue symptom present.

Following general tonic and local galvanic treatment hearing returned within one month to normal in right and almost normal in left. During this time Schwabach would vary from negative to positive and Weber from right to left. At no time was there any tinnitus or dizziness.

Some months after this, in December, 1907, was greatly shocked by the sudden appearance of her daughter, from whom she had not heard for some time, and about whom she was greatly worried. That night she attended the theater and heard perfectly well. The next morning on awakening found that she could hear absolutely nothing. Examination same day showed total absence of sound perception to all forks and the Galton whistle by air, and to forks by bone conduction. There was no tinnitus or disturbance of equilibrium. Patient complained of a sharp pain in the ears from She refused to take electrical treatments, the Galton whistle. claiming that it made her feel queer. During the next four months would occasionally hear the words Mama and Blanche, when loudly shouted in the ear by her son. She also noticed the sound of the elevated trains, but never heard the forks or whistle. In April perceived a C2 fork by air and occasionally street sounds. At this time she fell from a street car, striking her head, and again total deafness. In July resumed the galvanic current and in two weeks she could hear a C2 fork by bone in the right ear, certain words shouted in the ear and a steam whistle, though not the Galton whistle. The eye examination shows the hysterical limitation of color and visual fields, there are no somatic manifestations, there is a slight general hyperesthesia and increase of the reflexes.

The interesting points in this case are: the previous condition of impairment of hearing with an intervening period of normal hearing, the shock followed by a total and absolute deafness within twelve hours, the incongruity of the sounds she heard later, the condition of hyperesthesia of the body and of the acoustic nerve to sound as expressed by pain, with the anesthesia of the nerve as expressed by absence of perception of sound, and its being a bilateral affection.

BIBLIOGRAPH.

1. Politzer: Diseases of the Ear, 1908.

- 2. Urbantschitsch: Lehrbuch d. Ohrenheilkunde.
- 3. Jacobson u. Blau: Lehrbuch d. Ohrenheilkunde.
- 4. Bürkner: Arch. f. Ohrenheilkunde, 1884, B. 21.

5. Bezold: Lehrbuch d. Ohrenheilkunde.

- 6. Gradenigo: In Schwartze's Handb. der Ohrenh., ii, 1893, Cap. 6.
- 7. Gradenigo: In Haug's klin, Vortr., ili, 1896, Heft 13.
- Hammerschlag: Monatsschrift f. Ohrenh., 1899.
 Hammerschlag: Monatsschrift f. Ohrenh., 1901.
- 10. Habermann: Prag. med. Woch., 1880,
- 11. Veis: Münch. med. Woch., No. 13, 1899.
- 12. Eitalberg: Wiener med. Presse, 1887.
- Fränkl von Hochwart: Intern, klin. Runds., No. 9, 1893.
 Thanisch: Archiv f. Ohrenheilk., B 66, 1905.

DISCUSSION.

Dr. Shambaugh:-This is certainly a very interesting series of cases which the Doctor reports. These affections of the internal ear are in many ways the most fascinating of all the ear troubles we have to deal with. It is by no means easy to determine positively just what has taken place in the internal ear in disturbances of this sort. There is one type of internal ear troubles, of which I have seen several examples, where the symptoms are more or less typical of a classical Ménière symptom-complex, a sudden onset of dizziness, associated with tinnitus and deafness, the symptoms lasting for a comparatively short time and disappearing as suddenly as they came on. Symptoms occurring in this way can not be the result of a hemorrhage or an exudate into the labyrinth, otherwise they could not disappear so suddenly. It is probable that they have to do, however, with circulatory changes, a vasomotor disturbance of some sort.

There is another type of disturbance of the internal ear that I would like to refer to. It is these cases where we find only part of the Ménière symptom-complex present. In case this disturbance is limited to the cochlear part of the labyrinth, there is usually no hesitation in attributing the trouble to the internal ear. Such a disturbance would be tinnitus aurium and deafness. On the other hand, the symptoms may be limited to the vestibular apparatus, resulting in vertigo and disturbance of equilibrium, with possibly no disturbance in the function of the cochlea. In these cases one is very likely to attribute the disturbance of equilibrium to some other causes than internal ear trouble, blaming it upon some stomach trouble or upon some cerebral disturbance. I am inclined to believe that many of these cases are, after all, due to some circumscribed disturbance in the internal ear. We know, for example, that the blood supply for the vestibule and semicircular canals is quite distinct from the blood supply of the cochlea, though both come from the same vessel, but the distribution of the several branches is in the nature of end-arteries, in which no connection exists between the blood supply of one area and that of another. With this arrangement of the blood supply one can readily understand how it is possible for a lesion to be limited either to the cochlea or the vestibular apparatus.

There was one of the tuning fork tests referred to in the paper that might lead to some confusion. In referring to the tuning fork reactions found in cases of unilateral neuroses of the labyrinth, the writer states that one may find all the typical reactions of an involvement of the labyrinth, namely, a lateralization of the Weber test in the normal ear, and a positive Rinné on the affected side. This latter statement should be explained as applying only to those cases of unilateral deafness where the defect in hearing is but slight. Any decided defect in the hearing, involving but one ear, with a normal ear on the other side, would give a negative Rinné.

Dr. Monosmith:-I was very much interested in this paper, because in a case of mine functional paralysis of the acoustic nerve assumed a medicolegal aspect. I was called by the prosecuting attorney of our county to examine a young lady who had received an alleged assault 48 hours before, with a history of having bled from the ears. When they found her and began to talk to her she was apparently dumb, but upon further investigation they found that she was deaf; that she could hear by putting the mouth close to the ear and speaking very loud. He asked me to make an examination and find out the reason for the deafness. The drumheads were normal, Eustachian tubes were patulous and there was no evidence of blood in the external meatus. Bone conduction was lost. I was much interested in the observations of Hammerschlag, that even where we find the tuning forks are not heard, the watch and voice are often heard. Of course, in this case it was impossible to make a Schwabach, Rinné, or Weber, because she claimed she could not hear the forks either by air or bone conduction. She was able to hear the watch a quarter of an inch from the ear. At the trial that took place afterwards I based my diagnosis before the jury on the loss of bone conduction, making a diagnosis of hysterical deafness. The history was that the assault took place at night, the young lady was awakened from a sound sleep, and the deafness was attributed to fright. The deafness lasted for about six weeks and gradually recovered. It was quite an important case, as the prosecution made considerable of this point. I am very thankful for the privilege of hearing this paper to-day.

Dr. Spohn:-I desire to report a case of the hysterical form. This was a young male nurse, who had fallen twenty feet from a ladder, and when picked up was deaf, speechless and blind. His vision returned in about two weeks. This was in the vicinity of Cincinnati, and a number of splendid physicians had examined the man. Two months later he moved to Elkhart, but the change of surroundings made no change in him. When I first examined him he was speechless and deaf. There was no paralysis of the cords. No defect of the vocal organs or the organs of hearing could be detected. I, therefore, informed the family that it was a case of hysteria. The case was referred to Dr. Church, of Chicago, who verified the diagnosis. I tried electricity, tonics and outdoor exercises with no results. I had a similar case previously that recovered accidentally, at a time when she became very angry, so much so that she did not know what she was doing. All at once her speech returned, and she was all right thereafter. Remembering this case, I advised this method of handling the case to the family, or to engage him in conversation when he was asleep. It is a fact that many of these hysterical cases can be engaged in conversation during sleep, and if brought out of the sleep talking they will talk thereafter. It worked well in this case and he has been all right since, only he complains of the regular hysterical symptoms that many of these cases complain of.

Dr. Beck:—The pathological entity of angioneurotic edema should not be confounded with the pathology, or rather the not known pathology, of hysteria. I have a case of angioneurotic edema I have observed for two years daily—reports of this man as to his manifold swellings, and at one time during these two years this man had typical symptoms of labyrinthine involvement that did not last an hour or two, but 24 hours. Dr. Stein and a number of others in Chicago have seen him since under my care. Now I believe the differential diagnosis based on pathology of an angioneurotic edema of labyrinthine involvement and a true hysterical involvement is on the length of time. I believe angioneurotic edema will

24 hours.

DR. Sturbs (closing the discussion):—In reference to what the last speaker had to say, I would agree with him, and, as I stated in my paper, the attacks are short in duration, lasting from five to thirty minutes only. In the case I report I think the first attack was a true angioneurotic deafness, but by suggestion her attacks became longer and purely hysterical.

take a shorter time than any hysterical cases; the latter are more tenacious, while the other, which has a positive pathology, disappears in about

The case Dr. Spohn refers to in his experience reminds me of two reported by Gradenigo and Bing which followed accidents. But his line of treatment was more unique. It is in line with a case reported by Weir Mitchell, who forced a woman to use her legs after being bedridden for eight years.

A point I would like to accentuate in differential diagnosis, not only in this class of cases, but in all cases not purely those of suppurative otitis media, is the use of the tuning fork. That is one point I dwell on more than any other in talking to postgraduate students, who seem to think the tuning fork is a sort of a plaything. It is by its use alone that one can differentiate between the diseases of the sound-conducting and the sound-perceiving apparatus, and consequently we find there is a larger percent-

age of affections of the latter than was formerly supposed.

Dr. Shambaugh's allusion to the Rinné positive and negative is, of course, correct. I used the word positive, but it could only be true in cases of limited deafness. Of course, where the deafness is more marked or absolute, it gets to the point where bone conduction is so decreased on the affected side that the other side takes up the sound, being conducted clear through the skull. Consequently they would perceive the tone by bone conduction on the other or unaffected side, even when air conduction was not entirely lost on the affected side. Consequently we would have a Rinné negative on the affected side, due to its being heard on the opposite side.

THE STAPES IN RELATION TO THE TYMPANO-MASTOID OPERATION.

ALBERT H. ANDREWS, M.D. CHICAGO.

The accidental removal of the stapes in two cases a few years ago has led me to make a more careful examination of this bone and its surroundings, especially in relation to the tympano-mastoid operation. It is my impression that in addition to accidentally removing the stapes in the two cases mentioned, I have caused impairment of the hearing by injury to the annular ligament in a number of cases in which the stapes was not actually removed. As is well known, the stapes has three relations with the surrounding structures: first, with the incus by the incudostapedial articulation; second, with the stapedius muscle by the attachment of the tendon to the head, neck or the posterior crus of the stapes; third, with the margin of the fenestra vestibulæ by the annular ligament. Examination of these attachments shows that they are not all uniform in their arrangement, nor are they of the same relative strength in different individuals. In some the annular ligament is much stronger than in others, while the same may be said of the ligaments of the incudostapedial articulation. Probably the greatest variation is in the location of the attachment of the tendon of the stapedius muscle.

In looking over a few text-books on otology I observe that Politzer, Gruber, Gradle and Gleason speak of the tendon being attached to the head of the stapes, while Bacon, Burnett, Barnhill, Ballenger and Dench speak of its attachment to the neck of the stapes. In examining perhaps a hundred cadavers I found the stapedius muscle attached to the neck in some cases, and in still less number to the head of the stapes. In the majority it has been attached to the posterior crus just at its point of greatest curvature where it forms a sort of shoulder.

On account of the ease with which the stapes may be removed, or the annular ligament ruptured without removing the bone, certain precautions should be taken in that part of the tympanomastoid operation which has to do with the removal of the malleus and incus and the removal of granulation tissue from the neighborhood of the stapes. The attachment of the tendon of the stapedius

muscle to the back part of the stapes aids very materially in holding that hone in position when forward traction is made upon it. Hence in removing the incus if the incudostapedial articulation is separated by pulling the incus forward from the stapes, injury to the latter is much less liable to occur. This can be accomplished by grasping the incus either by the short process or the body and giving the forceps a twist which will throw the long process forward before attempting to extract the ossicle. In work upon the cadaver the annular ligament has been ruptured experimentally by twisting the incus backward instead of forward before extracting it. While it is not easy to demonstrate on the patient that the annular ligament has been injured, the fact that hearing is more impaired, that bone conduction has been lessened after the operation, and that on the cadaver the annular ligament has been ruptured by procedures which are common in operations, it is reasonable to suppose that this accident has happened in operations more frequently than any one has suspected.

In the literature a number of cases of removal of the stapes are found, and in some it is reported that hearing has been but slightly impaired and that the patient suffered no special inconvenience. Such has not been my experience. In both the cases mentioned there was marked vertigo, which began to subside after a week but did not entirely disappear for two or three months. In one case the patient, a girl of 14, was distressingly nauseated for several days and would vomit whenever she raised her head from the bed. The hearing in each case was apparently destroyed, the patients being unable to appreciate sound either by air or bone conduction.

During the healing process it is important to prevent the formation of granulation tissue which may cover the niche of the oval window or by adhesions displace or limit the movements of the stapes and thus further impair the already damaged hearing.

It is not always easy to prevent the formation of excessive granulations in this neighborhood. As a general rule, however, it would seem that the less traumatism produced by the curette in the area immediately adjacent to the oval window during the operation, the less tendency we shall find to granulation tissue formation. When granulation tissue does form here, it should be carefully removed, either by means of a curette or the ear polypus forceps.

With the parts under local anesthesia, and with care on the part of the operator, the patient is not likely to permit any manipulation of the stapes which could injure the internal ear. The desirability of retaining for the patient all the hearing possible, together with the increased danger to life when the labyrinth is exposed to infection, seems to the writer to make this subject worthy of most careful consideration.

DISCUSSION.

Dr. Stein:-I wish to contribute my experience in two similar cases of accidental removal of the stapes during this radical mastoid operation. Both cases were operated on for bilateral suppurative middle ear disease, and in each case the stapes of the right ear was accidentally removed and found among the débris as we cleaned the ear out. To my utter surprise there was no disturbance following; no infection or disturbance in equilibrium or any marked involvement in hearing. In fact, in both of these cases, if I recollect correctly (in one I am positive), the hearing in the ear from which the stapes was removed showed improvement over the opposite side. In the other case I had considerable difficulty in getting a good result as to immediate healing. There was a good deal of granulation tissue, which formed adhesions between the roof and the facial ridge, but subsequently absorbed, as it usually does, with good results in hearing after a long time. I just mention these two cases in order to show that even the accidental removal of the stapes, although not to be encouraged at all, is not necessarily associated with any deleterious effects.

Dr. Holinger:—I have had a similar experience as Dr. Stein in accidental removal of the stapes, which happened to me once. I found the patient the next day sitting in bed reading the paper, whereas I expected, of course, to find him vomiting, etc. There was absolutely no reaction after that occurred, although I have to add that there was only about one-third of the footplate adherent to the prongs of the stirrup. However, I think the accidental or intentional removal of the ossicles will become rarer and rarer, in view of the fact that the conservative treatment of those cases, in which very often now the radical operation has seemed to be indicated, will take the place of the radical operation. Only the last letter I received from Professor Bezold contained a very satisfactory expression of the fact that in the German Otological Society large statistics have been brought out, where cholesteatomata and similar diseases that we have been treating by radical operation have shown to give much better results by conservative treatment in the way he described long ago.

Dr. Shambaugh:—One point I should like to emphasize, and that is that the stapes is the key to the whole conducting apparatus. It is the essential link in the chain connecting the membrana tympani and the labyrinth. A destruction of the drum membrane and the malleus and incus does not necessarily interfere to any great extent with the sound perception. On the other hand, an interference with the action of the stapes is bound to interfere in a very serious manner with the function of hearing.

In connection with the statement that has been made regarding the accidental removal of the stapes without much disturbance of hearing, I should like to remind you of the work which was done some years ago by Dr. Jack, of Boston. In removing the stapes in cases of middle ear deafness the stapes may be removed without tearing the endosteum that lines the vestibule and covers over the foot plate of the stapes, and those cases wherein the removal of the stapes, accidental or otherwise, the disturbance in hearing has been slight, must be looked upon as cases where this endosteum has remained intact. Experience has shown, however, that as a

rule these cases also later become very deaf, probably from the result of cicatricial formations in the niche occupied by the stapes. While one may occasionally, in performing the tympano-mastoid exenteration, accidentally remove the stapes without tearing the endosteum of the vestibule and without producing any immediate serious results, we must still look upon the interference with the stapes as a very serious matter in performing an operation upon the ear. In the first place, most of these cases will result in immediate and total deafness, and in the second place entrance to the labyrinth of infection from the tympanum may occur, leading possibly to a fatal termination.

DR. W. SOHIER BRYANT:—I would like to corroborate what Dr. Shambaugh has said. I assisted Dr. F. L. Jack a few years ago in his operation on the stapes. There were no cases of infection; all cases recovered with more or less vertigo, and most cases had improved hearing after the removal of the stapes. The question of preservation of the endosteum: it does not matter very much one way or the other. Some cases had a profuse flow of perilymph and other cases had no flow, and some of them had great vertigo and others not. The interesting part of the experiments was that the hearing gradually deteriorated even in the best cases. In the best case I think the hearing remained fair for two or three years, after which it was distinctly bad. In most cases the hearing decreased more rapidly. A favorable point was that the hearing was not notably worse after the operation than before, even after the loss of the temporary gain.

Dr. Andrews (closing the discussion):-I am familiar with the reasons given for continued good hearing after removal of the stapes, both accidental and intentional; that is, that the membrane covering the footplate remains intact, and that the internal ear is not opened into, but in both of my cases I am positive that it was, because the ear was comparatively dry when the stapes was removed, and immediately there was the presence of the intralabyrinthine fluid in the cavity. However, I am not ready to remove the stapes indiscriminately in these operations with the hope of improving the hearing, no matter what anybody else's experience may have been. This reference to the stapes, however, is not the only part of the subject that I want to present. Especially do I want to emphasize the necessity of keeping granulation tissue from forming around the stapes during the healing process. I am very sure that I have seen the hearing markedly impaired by this condition of things, when it might have been avoided had the proper precautions been taken both during the operation and in the after-treatment,

NEGATIVE PRESSURE AS A THERAPEUTIC AGENT IN DISEASES OF NASAL ACCESSORY SINUSES, THROAT, EAR AND MASTOID.

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My apology for this paper rests upon the fact that most continental observers who have investigated this field of work have reported results unqualifiedly unfavorable to the induced hyperemia methods of therapy in aural, nasal and accessory nasal affections, whereas my own experience leads me to regard it as a method of first rank. The therapeutic procedures of Wright and Bier are complemental, and the advantage of combining vaccines and hyperemia in combating infections has already been called to the attention of the medical profession in the field of general surgery by Dr. J. C. Hollister in a very able article written about eighteen months ago.

The advantages in general of such a non-operative cure of infections are so obvious as to need no mention. The conservation of affected and contiguous tissues theoretically possible along these lines would nowhere in the body show more conspicuous differences in functional end-results as compared with these end-results previously obtained along surgical lines, than in the regions of aural and nasal surgery. In the middle ear and mastoid the amount of scar tissue left by an infection cured by such non-operative procedure must be infinitesimal compared with that remaining after operative cure; the loss of mastoid bony substance would be in most cases so small as to be unappreciable, and it is upon these two changes that the impairment of hearing after otitis media suppurativa and mastoiditis depends.

In labyrinthine suppuration, operative interference is uninviting, to say the least. Should such a curative measure prove practicable for application to this class of aural affections, it would prove an inestimable boon. In affections of the accessory sinuses of the nose, whether of acute catarrhal, acute purulent or chronic purulent character, the measures advocated in this paper offer possibilities of conserving essential structures of turbinates and sinuses to an extent as yet unreached by any procedures hitherto undertaken.

Bier's method of applying induced hyperemia therapeutically has been the subject of a number of reports by continental observers. Bier's views on the subject of hyperemic therapy in otology and rhino-laryngology, as expressed by Meyer and Schmieden, are as follows:

Unassailable proof has been rendered, principally at Bier's own clinic, under the supervision and cooperation of a well-known ear specialist, that a large percentage of cases of acute otitis media purulenta with mastoiditis, as well as of acute exacerbation of old middle ear inflammations, can be cured without any major operation. Very recent cases heal under obstructive hyperemia alone. If inspection of the drum membrane suggests an accumulation of pus in the middle ear, paracentesis is promptly done, or a former perforation is dilated. With continued artificial hyperemia the fever usually drops quickly and the inflammatory process, with its pathognomonic pain, tenderness, redness and swelling over the mastoid, gradually subsides. . . . The elastic band around the neck is worn regularly for ten to eleven hours twice per day, or uninterruptedly for twenty-two hours with two hours intermission. A correct technic is allessential. . . . In chronic cases of otitis media or those of cholesteatoma, artificial hyperemia without operation should be discouraged. The same beneficial effect may be observed in the complicating acute affections of the frontal sinus and the antrum Highmori. . . . Obstructive hyperemia by means of the suction glass applied through the nostrils has been extensively tried for diagnostic purposes as well as for the treatment of suppurative affections of the accessory sinuses, including ozena. However, specialists are still greatly at variance as regards its value in these affections.

Fleischmann reports¹ 24 cases of otitis media suppurativa, 8 of which were uncomplicated, 12 with mastoiditis, 2 chronic cases with acute mastoiditis and 2 with perichondritis. He concludes that the method is dangerous on account of the fact that pain is apt to be relieved at the same time that the disease is spreading, thereby lulling patient and surgeon into a sense of false security and allowing intracranial complications to develop. He is inclined to regard the method of Bier with disfavor.

Iseme reports² 2 cases of acute otitis media suppurativa uncomplicated, 1 case of chronic otitis media suppurativa uncomplicated, 9 cases of acute otitis media suppurativa with mastoiditis. His conclusions are the same as Fleischmann's. Horslauer³ reported 1 favorable result in 14 cases of chronic otitis media suppurativa, 30 per cent. of which came to mastoid operation. He reported on the Bier method as being a distinct advance in the treatment of otorrhea, in spite of the poor showing of his statistics, certainly not a very convincing support of favorable views concerning the method.

Monatssehrift für Ohrenheilk., 1906, No. 5.
 Archiv. für Ohrenheilkunde, lxix.

^{3.} Münchener medizin. Wochenschrift, 1906, No. 34.

A year and a half ago, in a paper read before the Iowa State Medical Society, the writer broached his views on the subject of applying the methods here advocated to aural and nasal infections. The limitations of a small private practice render impossible the assembling of statistical evidence for or against the methods advocated in anything like convincing array. He can only outline the working theory of the therapeutic application of negative pressure, report his own successes and failures, and give his conception of the reasons underlying failures on the part of those using constrictive hyperemia.

The theory upon which these therapeutic measures are based is as follows: In the presence of an infection the body cells throw out barriers of organized inflammatory exudate round about the infected focus in an attempt to limit the spread of infection. While this barrier is of great advantage in confining infection from spreading, thus protecting contiguous structures, it has this advantage, that it provides a wall within which bacterial propagation and toxin elaboration can go on more or less undisturbed. Serum, the natural menstruum of the bactericidal antitoxic elements of the body, is found within the above mentioned barrier, but the difficulties of ingress and egress cause a serum stagnation within the infected focus, as a result of which the serum of the focus suffers a loss of bactericidal potency by reason of long continued contact with bacterial protoplasm within the focus using up these elements of its composition. This serum of lowered bactericidal potential eventually seeps out and its place is taken by fresh serum of higher bactericidal potential from the general circulation; but in many instances this serum exchange takes place so slowly that the bactericidal action of the serum elements is but very slight. In other instances, there may be a more rapid serum circulation through the infected tissues and still little or no antibacterial action on the part of the serum by reason of a low bactericidal potential of the serum of general circulation. In either case, until the occurrence of some change in conditions, the tide of victory would lie with the invaders. Attempts to bring about such changes as might turn the tide in favor of the body cells, involve consideration of the invading organism and consideration of the individual attacked.

The attacks of certain bacteria are, of their own nature, of short duration. We are wont to speak of diphtheria as a self-limiting disease. Why? Because whether interfered with or not, the attack will have terminated of its own accord within certain compara-

tively short limits of time; at the end of which, if death has not supervened, the patient will have recovered. The attacks of other bacteria are of the opposite type. Unless successfully interfered with the process may go on for an indeterminate period.

The mention of bacteria under such a classification is relevant only in this, that it enables us to put out of our consideration at the start all those of the first or self-limiting type. Inasmuch as bactericidal measures suitable for application to bacteria within the body tissues have not as yet been developed to a point where decisive effects can be accomplished within the ordinary lifetime of such short term insults, the principal fight in such instances must be directed, not against the bacteria themselves, but against their life products. This is essentially the field for antitoxins, not for vaccines or induced hyperemia.

All bacterial infections not falling in this short-term group are fit subjects for attack along the lines of vaccines and induced hyperemia therapy. Some along the borderline between these two classes may properly be attacked both antibacterially and antitoxically. The general condition and the specific resistance of the individual attacked by the infection have very important bearings upon the subject of antibacterial therapy. In one patient it may be that the specific resistance to an infection will be found very low (witness low specific resistance to staphylococcus in acne subjects), in another with the same infection it may be found very high. Vaccination is indicated in the first case, not in the second case. Thus when using induced hyperemia in combating infections, it will be of considerable importance in some cases to combine with this measure a judicious use of exogenous vaccine, in order to secure a high antibacterial potency of the general circulation; and in other cases such vaccination will be quite unnecessary, the secondary effect of the induction of hyperemia proving adequate in maintaining high opsonic content in the general circulation.

There are obvious and important differences between the constrictive method of inducing hyperemia used by the continental observers and the method advocated in this paper. Constriction results in venous stasis, which in turn causes back pressure in the arteriovenous capillary anastomoses and thence in the arteries. Stasis is followed by dropsy into the tissues drained by the constricted veins. Consider for a minute what this means in chronic sinuitis of one of the accessory nasal sinuses for example. Obstructed drainage due to inflammatory changes in the sinus mucosa has already resulted in retention of mucopurulent matter with

retention and pressure symptoms; possibly it has even reached the stage where the edematous mucosa, lacking room within the cavity for its increase in bulk, has forced its way through the normal openings into the nose in the shape of polypi, still further obstructing the exit of pus from the cavity. Increase by constriction this already obstructive dropsy, and it is small wonder that effects of an unfavorable, rather than of a favorable, nature should be noted. The same unfavorable effect of constriction should be expected in acute mastoiditis, in which condition alarming symptoms are always due to blocking up of the exits of the infected cavities, rendering drainage insufficient. Freeing the exits of all such cavities, not only of polypi, but of all swelling of adjacent tissues and mucosa, removing all secretion possible by a continuous stream of warm alkaline solution which tends to dissolve it and syphon it from within the cavity, using from two to four quarts of lavage solution at a sitting, we open up our exits as widely as possible. Following this up by negative pressure which sucks out of the cavity a large amount of the retained secretion and sucks into the tissues lining the cavity a sudden great excess of fresh serum and lymph and phagocytes, we have not only still further increased our drainage by mechanical means, but we have dislodged stagnant lymph and serum of low opsonic value and brought in an excess of lymph and serum of high opsonic value. After these changes in the tissues have been accomplished the treatment is at an end. The elasticity of the tissues allows a reactionary subsidence of the acute distension caused by the negative pressure. In the very nature of things such subsidence can occur only by the moving forward into the general circulation of the excess of fluid which has caused the distension, as there is possible no backward outflow. So it must result in the outflow of the old stagnant fluids whose opsonic potential is already exhausted, and the replacement of those fluids by lymph and serum of high opsonic potential.

Case 1.—History.—Male, aged 18, was brought by family physician March 12, 1907, for operation. Acute suppurative otitis media of one week duration. Bacteriology: Bacillus lanceolatus and pus cocci.

Present Condition.—Pain, prostration, fainted twice to-day, slight sanguineous pus discharge through punctate perforation in anterium inferior quadrant of membrana tympani. Mastoid swelling and extreme tenderness. Temperature, 103 F.

Treatment.—Anesthetized, free incision from floor up through membrana flaccida into attic. Suction applied for ten minutes, after which patient was kept at absolute rest with occasional application of hot water bag to mastoid. Suction was repeated daily.

In the following 72 hours the temperature fluctuated between 102 and 99 F. Pain was practically nil, discharge free. Two days later temperature became normal. Swelling and tenderness in mastoid disappeared. Patient gained strength and felt almost well. Discharge had ceased by the thirteenth day, when patient went to work. A month later hearing was full normal.

Case 2.—History.—Male, aged 13, was seen March 24, 1907. Mastoiditis complicating acute exacerbation of chronic suppurative otitis media A. S. following searlet fever at 4 years of age. Has had occasional exacerbations of mild character, never before as severe as this one. Profuse discharge of thick intensely foul pus for three days, followed by diminution in amount of discharge, great increase of pain, edema and extreme tenderness over mastoid.

Examination.—Auricle stands out at angle of about 30 degrees. Teat-like pouting perforation in anterior inferior quadrant of tympanic membrane. Temperature, 102.8 F.; prostration and marked febrile symptoms. Bacteriology: Staphylococcus and

pneumobacilli.

Treatment.—Incision carried from floor through perforation deep into attic. Suction applied for ten minutes. During first forty-eight hours temperature fluctuated between 103.8 and 100 F., and pain disappeared under daily suction; after fourth day temperature remained normal and patient could come to office daily, where suction was applied for eight to twelve minutes. On the eighth day all mastoid edema had disappeared, some tenderness still remaining. On the fourteenth day began instilling absolute alcohol after applying suction. This was continued daily for two weeks, when discharge had almost disappeared. Very large faucial tonsils were enucleated and nasopharynx curetted. Suction applied twice weekly until two months and a half after coming into my hands all discharge had ceased, lower anterior quadrant of drumhead healing partly adherent to inner tympanic wall. Hearing improved from inability to hear 36-inch watch on strong pressure to watch at 8 inches. One year later heard same watch at 12 inches.

CASE 3.—History.—Female, aged 22, was seen May 10, 1907. Acute suppurative otitis media, two days, no perforation. Temper-

ature, 99.6 F., intense pain, no mastoid symptoms.

Treatment.—Made free incision of drumhead. Found B. lance-olatus. First twenty-four hours patient was much improved, during following ten days improvement was interrupted by occasional pain in ear and some mastoid tenderness. By twentieth day discharge had almost ceased. At this time symptoms of an exacerbation presented, perforation began to pout, mucoid secretion changed to finely granular pus, and mastoid pain began. Made free incision from floor to attic and applied suction for ten minutes, evacuating an enormous amount of pus; temperature normal since tenth day. Eight days later I was compelled to make an extensive simple mastoid operation, finding granulation tissue and pus from tip to zygomatic cells. Healing was uneventful.

Case 4.—History.—Female, aged 23, was seen Dec. 29, 1907. Patient presented furunculosis of posterior inferior canal wall; had been previously operated on for acute mastoiditis, simple operation having been done. During this operation I had found it necessary to curette through a small portion of posterior bony canal wall, the site of which dehiscence chanced to be that selected by the present furuncles. After thirty-six hours of intense pain, during which time posterior wall was so swollen as to hide all view of the tympanic membrane, patient experienced sudden spontaneous subsidence of all symptoms, including swelling. In the next twenty-four hours an explanation of this unlooked for eventuation of the external otitis became apparent. The old mastoid scar became reddened, edematous and tender; temperature, 102 F.; when suppuration had occurred beneath the cuticle-periosteum, pus found ready escape backward through the dehiscence of the posterior bony canal wall into the old healed mastoid cavity.

Treatment.—I at once incised the old scar, incision being followed by free discharge of pus. Streptococci and pneumobacilli found. In spite of drainage mastoid continued to discharge through scar incision for over a month, patient feeling well and strong, however, and pursuing occupation as high school teacher. I made many applications of negative pressure to discharging sinus during the next four weeks, but failed to secure cessation of discharge, though there was great diminution in amount of pus. I finally operated, cleaning out old mastoid cavity, incising the tympanic membrane, which had been intact, and establishing gauze drainage from cavum epitympanicum backward to mastoid incision. Healing was interrupted by a week of facial erysipelas, after which it was uneventful. Hearing a year after first operation had been 8 inches for 36-inch watch. Now, six months after this second operation, she hears same watch only ½ to 1½ inches.

My first two cases of acute mastoiditis had responded so nicely to treatment by negative pressure that I was quite a little disappointed at being compelled to operate on the subjects of my next two applications of this method. Case 4, however, I was inclined to consider hardly a fair test on account of the entire change in the local circulatory and cellular conditions in this region, due to the previous operation.

I decided, however, after these two experiences to make a longer application of negative pressure to the next acute mastoiditis so treated. And in this connection let me make it clear that I have not applied this treatment to every acute case, nor do I consider it adapted to all acute cases. There are certain cases which early present the picture of quickly spreading virulent infection with rapidly deepening intoxication, intense and steadily increasing prostration. These cases I would certainly operate at the earliest possible moment without attempting any conservative delay.

CASE 5.—History.—Female, aged 28, was seen March 19, 1908. Had been treated for acute catarrhal Eustachian salpingitis three months ago, which gradually improved without perforation of the tympanic membrane. Five day ago developed acute suppurative otitis media in same ear. Temperature, 101.4 F., thick purulent discharge for past three days, mastoid swelling, redness and tenderness.

Treatment.—Anesthetized and incised the tympanic membrane from floor through membrana flaccida. Applied negative pressure for twenty minutes, evacuating enormous quantity of sanguineous pus. At end of twenty-four hours temperature 101.8 F., headache, malaise, severe pain. Anesthetized again and reopened incision, applying negative pressure forty minutes. Found the Diplobacillus lanceolatus. In twenty-four hours temperature 99.2; felt much improved, free discharge from drumhead incision. Two days later applied negative pressure five minutes without anesthetic and repeated this cautiously every day for next week. Except for an intercurrent furunculosis of canal, patient made an uninterrupted recovery. Six weeks after first operation, hearing for 36-inch watch was 24 inches.

Case 6.—History.—Female, aged 62, was seen with a chronic suppurative otitis media, extremely foul pus, discharge dating back to scarlet fever in childhood.

Treatment.—View of drumhead obscured by large polypi; these being evulsed, large perforation in inferior posterior quadrant was exposed. Applied negative pressure without anesthesia for ten minutes, followed by 95 per cent. alcohol instillation. Repeated negative pressure and alcohol daily. A week later evulsed more polypoid tissue. At the end of twenty-four days perforation had entirely closed, having contracted adhesions with inner tympanic wall. Hearing had improved from not hearing 36-inch watch on firm pressure, to hearing same watch at 3 inches. Perforation has remained absolutely closed for four months.

Case 7.—History.—Male, aged 39, with exacerbation of chronic catarrhal sinuitis, three days, was referred to me April 17, 1908, by family physician. Temperature, 100.8 F., has reached 103 F. Intense pain in head, particularly on left side, in inferior maxillary and frontal regions, tenderness on pressure over frontal and inferior maxillary sinuses. Has used warm Seiler's douche for past three days with slight relief.

Treatment.—Pain has grown steadily worse, grain ¼ morphin hypodermically necessary this a. m. Applied cocain to swollen turbinates and contiguous mucous membrane and applied negative pressure evacuating about fl5iv of thick pus. Pyocyaneous and pus cocci found. Relief of symptoms was immediate within three minutes. After full shrinkage of middle turbinates found large true hypertrophy of anterior end of right middle turbinate, which I snared off at once. The left had been the larger of the two and most of pain had been on left side, but after cocainization there was no bogginess, so this was not touched. Ordered continuation

of Seiler's douche. Relief of pain was complete from 10 a.m. until 3 a.m. next morning, when it again became so intense as to require morphin. Negative pressure applied at 9 a.m. after cocainization and relief of yesterday again experienced. This was continued daily for about a week, then successively thrice weekly, twice weekly, once weekly, until by the end of six weeks no pus had been seen for a week or more, nothing but non-purulent mucus, and this had about ceased to appear in appreciable quantities. Since the third day patient had been free from pain and had been able to go back to his work as supervising architect.

Case 8.—History.—Male, aged 35, had been under my care off and on for nearly three years on account of chronic catarrhal sinuitis involving frontal, ethmoidal and superior maxillary sinuses on each side, occasionally worse on right, occasionally on left. Patient had repeatedly refused proposed operative measures for relief of intranasal conditions, which included very thick deflected septum. Had also been in the hands of other rhinologists occasionally, all competent men, and had once submitted to some turbinate operation at the hands of one of these men, upon which ensued an unfortunate hemorrhage, which only served to confirm him in his opposition to subsequent operative proposals. He had run the gamut of frontal and maxillary lavage, topical applications to infundibula and turbinates, alkaline nasal lavage at my hands, and of catarrh inhalers, jellies, etc., at his own hands, without signal relief.

Treatment.—On the occasion of one of his excruciating headaches during a purulent exacerbation of his trouble, I packed the infundibula with cotton saturated with cocain solution as I had often done for him, and after thoroughly shrinking the tissues, I applied negative pressure to the nares. The effect was particularly satisfactory because of the fact that it was comparable with effects of many other procedures applied under similar conditions on the same patient; within five minutes after evacuating a large quantity of greenish pus, all pain had disappeared. Pursuing this plan of treatment, at first daily, later thrice weekly, twice weekly and at last once weekly, I was able to keep the patient almost free of headaches and that sensation termed "woodenheadedness," "balloon feeling," etc. Three subsequent purulent exacerbations have since been successfully aborted by early application of negative pressure.

CASE 9.—History.—Female, aged 16, was referred to me by family physician because of headache. She had had gastro-intestinal disturbances and he had been inclined to attribute the headaches to this source, though treatment for them along this line had proven unsuccessful. She was highly myopic (wearing — 4.50 sph.) and was of a catarrhal type. I found she had a history of frequent attacks of tonsillitis and pharyngitis and had recently had a mild suppurative otitis media.

Treatment.—Curettement of the nasopharynx and enucleation of faucil tonsils was first done, after which I turned my attention

to the nose, which was in a condition of marked hypertrophic After shrinking the structures contiguous to the infundibula and washing thoroughly with a large quantity of warm alkaline solution, I applied negative pressure for about eight minutes and succeeded in evacuating a large amount of very thick, stringy, yellow pus, most of which came from the superior maxillary sinus, to the great surprise of the patient, who declared she had never been aware of the presence of such secretion. Her discomfort and headache promptly ceased after the discharge and she remained free from symptoms for two days, when I reapplied the negative pressure with same results. This course of treatment was continued at first thrice weekly, later twice weekly, at last once a week. The character of the evacuated secretion changed to mucus and the amount gradually diminished to a normal quantity. Occasionally after exposure she suffered slight exacerbation of symptoms, with a tendency toward increase in quantity and purulence of secretion, but her general progress was steadily toward what seems now to be a complete cure.

Case 10.—History.—Female, aged 22, seen April 22, 1908, with a history of morning headaches for over two years, often so severe as to prostrate her. Pain comes on about 8 or 9 a. m. and lasts till 1 to 4 p. m., vomiting occurs frequently at the height of the pain, but slight relief of pain is experienced afterward. Narrow, high-arched palate, thick septum, very much hypertrophied nasal mucosa showing true general papillary hypertrophy. Lower and middle turbinates in contact with septum.

Treatment.—After shrinking the infundibular regions as much as possible, negative pressure evacuated much tenacious vellow pus containing pus cocci and some diplobacilli. Patient experienced great relief at once. I pursued the usual course of thrice weekly and later twice weekly applications of this treatment. The first four weeks were passed in comparative comfort, patient having had only an occasional abortive attack of headache. While superintending moving her household goods to a new home, she was exposed and suffered sudden exacerbation, chill, temperature 102 F., intense pain in head, nausea. She came at once for a treatment at 2:30 p. m. I was called at 7:30 p. m., found her frenzied with pain, temperature 102.8 F. I was compelled to give morphin, grain 1/2, hypodermically, in two injections two hours apart, before there was any appreciable diminution of symptoms. Later, after being confined to bed for three days in this attack, patient resumed treatments every day with very unsatisfactory results. The relief she had experienced at the beginning of the treatments was conspicuously absent and at times I suspected her discomfort had been actually increased by the negative pressure. After a week of nonsuccess. I advised her to give up all treatment and watch developments with a view to some operative procedure in case symptoms should demand interference. Five weeks later she reported having been almost entirely free from symptoms and she had had no bad headaches. After four months patient reports having had no return of headaches, though she has occasional discharge of large amount of thick mucoid secretion. In this case I am somewhat at a loss to account for the apparent increase in symptoms while under treatment, promptly followed by disappearance of all discomfort on discontinuing negative pressure. It may be that absorption of the inflammatory hyperplastic tissue in the sinus mucosa was interfered with by the frequently induced congestions and that on ceasing to induce hyperemia such absorption did occur with beneficial subjective results. I am more inclined to believe that this case was one not well adapted to treatment along these lines and that the improvement noted just now is only a temporary fluctuation toward betterment, such as is shown by most cases of chronic sinuitis suppurativa.

CASE 11.—History.—Male, aged 46, has had chronic catarrhal rhinosinuitis for years, has been cauterized, chromicized, etc., at different times. For past few weeks has had balloon feeling in head, morning headache, discomfort in frontal, ethmoidal and superior maxillary regions, slight tenderness on pressure, with more or less obstruction to nasal respiration. Somewhat irregular septum, boggy turbinates with little true hypertrophy.

Treatment.—Infundibular structures were well shrunken, after which warm douche and negative pressure were applied. Evacuation of considerable grayish thickened mucoid secretion was followed immediately by relief of symptoms. Treatment was continued with gradually increased intervals until within three weeks there was no recurrence of symptoms and patient felt perfectly well. Patient, who is a physician, is extremely enthusiastic over the success of this method of treatment, declaring it to be far the pleasantest and most efficacious treatment he has ever experienced.

Case 12.—History.—Female, aged 26, has well marked beginning atrophic rhinitis with usual purulent sinuitis; crusting and odor have been source of great discomfort to patient. Has been treated for over a year by topical applications and lavage without improvement.

Treatment.—Warm alkaline lavage followed by negative pressure applied daily for ten days. At first free hemorrhage occurred at each treatment and a large amount of foul, yellow, thin mucopus was evacuated. Hemorrhage ceased after five or six treatments, discharge grew less in amount, lost its foulness, becoming more and more mucoid. Subjective symptoms ameliorated, odor disappeared. After eight weeks, during which intervals between treatments were gradually prolonged, patient was so far improved that she was instructed to stop treatment, using only warm lavage at home once or twice daily, and to return in case there was any increase in symptoms. I have not seen her in over two months, but she reports no return of odor or of sufficient crusting for her to be conscious of its presence.

SUMMARY OF CASES.

In summing up these cases, together with about twenty other cases not detailed because of a desire to avoid unnecessary and tiresome repetition, I must report that the results of applying induced hyperemia therapy in the manner described have been so satisfactory in my hands that I can but regard it as a therapeutic method of indubitable worth. It is not recommended as applicable in all cases. In properly selected cases it is of superior merit in that it offers a cure without the operative hazard, in many cases without even the hazard of a general anesthetic; and it is of especially superior merit in that it offers a cure with the least possible loss of tissue and disturbance of anatomic relations and consequently the greatest possible conservation of function.

METHOD OF APPLICATION.

Application of negative pressure for relief of purulent sinuitis should always be preceded by thorough shrinkage of intranasal structures. The technic of applying negative pressure to the nose and ear is simple and needs no detailed description. Any practical means of maintaining continuous suction may be made use of. An ordinary air-pump operated by water or electric power seems best adapted to the purpose. In the office I use the chemist's vacuum water pump suggested by Dr. Frank Brawley, of Chicago, to whom I wish to acknowledge a deep indebtedness for having brought to my attention this excellent device for applying negative pressure in these regions. For portable use I have impressed into service an old glass ear syringe of 100 c.c. capacity. In using either pump or syringe, it is better to use non-collapsible tubing, rather than the ordinary rubber tubing. To the intake tube is attached a suitable tip of glass or hard rubber. The Siegel otoscope is very satisfactory for use in the ear. The olivary tip or the glass tip devised by Dr. Will Walter is best adapted for use in the nose.

The nostrils are occluded, one by inserting the nasal tip, the other by pressure from the patient's thumb. The negative pressure is then applied and at the same time the patient is instructed to swallow, to start the act of saying K, or to open the mouth very widely. Any one of these acts will bring the soft palate up against the posterior pharyngeal wall, and the negative pressure will hold it in this position, thus closing off the posterior openings of the nasal chambers and allowing the partial vacuum formation in the nares. A great advantage of the water vacuum pump over other methods of inducing negative pressure is the absolute control

allowed the operator over the amount of negative pressure applied. By opening or closing the water cock the negative pressure can be varied immediately according to the desire of the operator.

THE IMPORTANCE OF POSTURE.

After a considerable experience in using this treatment in purulent sinuitis. I have come to realize that posture plays a very important part. I have often been unable to evacuate pus from a maxillary sinus, for example, while the patient is in an upright position, only to find that by placing the head for several minutes previous to the application of the negative pressure in such a position as to cause the contents of the sinus, by gravitation, to overlie the natural opening or openings, an enormous discharge of thick pus follows immediately upon the reapplication of even slight negative pressure in the new position. I would lay special stress upon the importance of posture and of non-collapsible tubing. It is convenient to have a small bit of glass tubing inserted a few inches away from the tip so that the operator may observe the passage of pus from the nose. It is also a great convenience to have a four ounce wash bottle at some convenient point along the tube for collecting the secretion removed.

1130 Main Street.

DISCUSSION.

Dr. Beck:—I believe that we have not had a paper of greater importance to us in the treatment of ear, nose and throat affections than the paper that Dr. Lewis presents here. I want to say this in appreciation of his work, that along these lines must our modern therapeutic results come; I mean by the aid of hyperemia, or the conditions that produce hyperemia, whatever method is used, vaccine therapy, or the internal administration of such remedies that will increase the local as well as the general vitality of the tissues. His work in the line of vaccine therapy and treatment by hyperemia is certainly to be commended, and any one who has not already gotten into the band wagon had better do so very quickly. I can say that the results are startling. I could go on enumerating a number of cases only to emphasize the fact that we must work in that line absolutely. I want to call attention to the fact that to-morrow, if I have the opportunity, I will present another method whereby suppurative cavities have been healed up by precisely the same principle by increasing the vitality locally by injecting bismuth paste into the cavities.

Dr. Sohier Bryant:—I would like to say that I have used negative pressure or suction most successfully in treating selected cases of middle ear suppuration since 1902.

Dr. Holinger:—There is no question but that a great deal has been accomplished by this Bier treatment, and before the Chicago Laryngological Society I read a paper on the subject and showed some instruments that I used for the purpose. But I want to caution against expecting too much from it. I used constriction of the neck in a lady suffering from tubercular laryngitis which was so far on the mend that, while she came

to me absolutely aphonic, she improved so that she was able to sing. Therefore, the case was decidedly on the mend, and I thought I would use the constriction more as an after-treatment. What followed was startling. Her mother insists that before I started out on this after-treatment all the patient's functions were normal—urine, sleep, menses, bowels, etc—but with the day I started the constriction all these functions became deranged, and the disease made very rapid progress toward a fatal meningitis. She developed a very sudden tuberculosis at the base of the brain and died. In tubercular laryngitis certainly I shall never use constriction again. In affections of the nasal sinuses, acute as well as chronic, I use aspiration every day, and especially in acute sinuitis, frontal as well as others; it is surprising how much we can accomplish even at a single treatment.

DR. ANDREWS:—I think there is no question of the good accomplished by this method of treatment. The greatest question lies in the diagnosis. If a man happens to get hold of a few cases of chronic otitis media, due to necrosis in the attic, antrum or mastoid, and fails in the use of this method of treatment, he is likely to condemn it, when it is not the fault of the method, but the fault of diagnosis. On the other hand, if he finds cases in which there is no condition present which Nature, with the assistance of this form of treatment, is not able to overcome, the patients get well and he sings the praises of the method. I think the same is true with reference to the nasal accessory sinuses. There are conditions present at times which Nature is absolutely unable to overcome, even with the assistance of this plan. In other cases Nature is able to overcome the diseased condition, and the patients get well. It is a question of diagnosis rather than of treatment.

Dr. Lewis (closing the discussion):—I can only say in closing that I make a point in the paper, in a part which I did not get to read, of the method not being applicable, by any means, to all cases, and that very careful selections must be made. But I believe, from an experience of 50 or 60 cases within the last few years, for that particular type of cases to which I consider it applicable, there is no method of therapy that gives half so much satisfaction as the use of negative pressure in infections of the middle ear and accessory nasal sinuses.

CHRONIC INTERSTITIAL OTITIS OR CHRONIC MIDDLE EAR CATARRH AND OTOSCLEROSIS.

W. SOHIER BRYANT, A.M., M.D. NEW YORK.

The object of this paper is to justify the author's opinion that a single fundamental pathological condition underlies the changes of the middle ear formerly classified under two headings, chronic middle ear catarrh and secondary otosclerosis. This condition, he thinks, is appropriately described by the term chronic interstitial otitis. It is the author's opinion that secondary otosclerosis, the type associated with middle ear changes, is the result of the same interstitial inflammation which affects the connective tissue of the middle ear in chronic middle ear catarrh. In secondary otosclerosis, however, the effects of the inflammation have invaded the underlying bone. The author also thinks that, clinically, even in the cases with hereditary history, otosclerosis is usually of the secondary type. He believes that the heredity is not a quality of the otosclerosis, but that otosclerosis depends upon an hereditary defect of the system which predisposes to disturbed circulation of the mucoperiosteum and to otosclerotic changes.

Chronic interstitial otitis is a condition of the middle ear which commences with chronic congestion of the mucous membrane or mucoperiosteum. Sequent to this congestion occur round-celled infiltration resulting in fibrosis of the membrane, contraction of the fibrous tissue and anemia consequent on the compression of the blood vessels. The congestive, infiltrative and fibrotic stages may, however, be omitted, leaving anemia to take the primary place in the cases formerly classified under otitis catarrhalis insidiosa. Last of all, degenerative changes take place. The final changes caused by the anemia include atrophy, degeneration and calcification. The diminished blood supply in the bone underlying the affected mucoperiosteum, brings about bone absorption, osteoporosis and hyperostosis. Although these changes in the bone have been described by many writers on the subject, there has been as yet no entirely satisfactory etiological explanation. The foundation for the author's explanation rests on (a) an histological analogy and (b) on his clinical experience.

The histological analogy of the bone lesions of otosclerosis is found in the histological identity of these lesions with certain bone lesions occurring in later syphilis. The syphilitic bone changes are dependent on primary vascular changes in the periosteum which cause a diminished blood supply to the bone, followed in turn by absorption of the old bone and the growth of new bone. The author thinks that the bone changes of the labyrinth in secondary otosclerosis can be explained on the basis of antecedent mucoperiosteal anemia. Familiar facts are the vascular changes of the mucous membrane and mucoperiosteum of the middle ear and their results in infiltration, fibrosis, contraction, anemia, atrophy and degeneration. The author thinks that these changes, occurring in the mucoperiosteum of the outer labyrinthine wall in predisposed individuals, cause bone changes within the osseous capsule identical with the changes caused by a similar alteration of the periosteal blood supply in other bones due to the syphilitic infection.

The clinical foundation for the author's etiological explanation of secondary otosclerosis is derived from a number of years' clinical experience with a large amount of material. This experience is exemplified in the following series of 200 successive cases of chronic interstitial otitis.

This series of cases has been almost entirely created on the basis of disturbed circulation. Improvement in hearing is shown in the otosclerotic class as well as in the cases of chronic middle ear catarrh. All cases with acute symptoms were carefully excluded from this series and every case that had any sign or history of aural suppuration was rejected. The selected cases all showed a relative increase of bone conduction indicating some lesion of the sound-conducting apparatus located somewhere between the external canal and the perilymph. All the cases showed a rise of the low limit of tone perception.

One hundred and twenty-four cases were seen only once or twice and then passed from observation. These patients were satisfied with one or two treatments. They came for some complaint other than interstitial otitis, or were quickly relieved, or were only seen in consultation. These cases, therefore, were not seen enough to furnish a clinical description of the course of the ear affection.

The 200 cases represent a proportion of 150 cases of chronic interstitial otitis per 1,000 ear cases examined. Ninety-three cases was the proportion of chronic interstitial otitis per 1,000 cases examined that received no prolonged ear treatment. Fifty-seven cases was the proportion of chronic interstitial otitis per 1,000 cases examined that received extended treatment for chronic interstitial otitis.

An analysis of the 76 cases that allowed more careful study gives the following data: Thirty-four cases gave a typical picture of otosclerosis. The other 42 cases had abnormalities of the tympanic membranes and tubes. Age of patients: Forty were over 40 years of age, 36 under 40 years of age, 22 were between 40 and 50 years, 12 between 50 and 60 years, 5 between 60 and 70 years, and 1 between 70 and 80 years.

The cases had the following length of history of failing hearing: Two cases under 1 year, 5 between 1 and 2 years, 11 between 2 and 5 years, 9 between 5 and 10 years, 12 between 10 and 20 years, 4 between 20 and 30 years, 2 between 30 and 40 years, 1 between 40 and 50 years, 8 "several years," 22 "many years."

The method of treatment used was intended to affect favorably the tympanic circulation. It was chiefly intranasal, sometimes constitutional tonic, occasionally local tympanic. Following are the results of treatment: Hearing slightly improved, 2 cases; improved, 43 cases; much improved, 27 cases; considerable decrease of hearing in spite of treatment, 1 case; slight decrease of hearing, 2 cases; unchanged, 1 case. Total improvement, 72 cases, or 95 per cent.

While the 76 cases were under observation, which for most of the cases has been for a period exceeding two years, the improvement brought about was maintained in all but two cases.

Of the three cases that showed decrease of hearing, after treatment, one was 53 years old and very deaf, with opaque membranes and occluded tubes; one was 27 years old and heard well with normal membranes and open tubes; one was 23 years old and slightly deaf, with transparent membranes and open tubes.

Long history of or degree of deafness did not affect the favorable prognosis for the beneficial results of treatment.

All the hearing tests were for air conduction.

CONCLUSION.

Chronic interstitial otitis includes chronic middle ear catarrh and secondary otosclerosis. The bone lesions of secondary otosclerosis are due to diminished blood supply of the tympanic mucoperiosteum.

Clinically, otosclerosis appears to be of the secondary form. Chronic middle ear catarrh and secondary otosclerosis yield to the same treatment independent of age, degree of deafness, or length of history.

The improvement following treatment is markedly permanent. The prognosis is good for improvement in chronic interstitial otitis.

DISCUSSION.

Dr. Holinger:—The cases that Dr. Bryant speaks about can not be differentiated by the means that he uses. Accurate tuning-fork tests and the microscope have shown that ten years ago. The clinical symptoms, slow beginning, slow progress of deafness, noises, etc., etc., are found in cases that we know now suffer from affection of the middle ear, as well as in patients who have affections of the labyrinth. Diagnosis, prognosis, treatment are, therefore, different from what Dr. Bryant makes them.

DR. PYFER:—Dr. Bryant says that otosclerosis is a continuation of the middle-ear catarrhal process. Why, then, do not you find in otosclerosis binding down of the ossicles or the stapes fixed with the fibrous tissue? You do not see it. You never see it in stained preparations. I think it is a mistake to treat these cases. All treatment is doomed to failure when you have an otosclerosis. You may think you get results, but in two or three years the condition shows decided change for the worse; in middle-ear catarrh the condition can always be improved with treatment.

Dr. Pynchon:-These cases of pronounced deafness do not spring up suddenly. I think that the condition of the bony structure of the labyrinth develops secondary to a middle-ear catarrh or a tubal insufficiency, so in all these cases, which are classed as labyrinthine, because the labyrinthine trouble predominates, you will invariably find that there is a certain amount of middle-ear complication, and if the cause thereof is removed it assists very largely in staying the progress of the labyrinthine trouble. Now you will have a man come to you, over 35 years of age, with ear trouble. He did not notice it in early life, but gradually began to have a progressive deafness. I claim you will find a time when he thought that the hearing was impaired somewhat and then it got better. In other words, climate had been a factor. You will examine and find some malconditions of the fauces and nose, causes which may in some cases produce very pronounced middle-ear conditions, though the same causes in other cases do not seem to produce very much trouble. instance, suppurative troubles of the ear are associated often with nasal stenosis. In others, an equal amount of stenosis does not produce this trouble. You must take it for granted it is some pathological impairment, and it is wise to correct it. So I am in hearty favor of looking over the nose and upper air passages and correcting those conditions which in some cases may produce middle-ear trouble. And I particularly want to call your attention to the submerged tonsil.

Dr. Andrews:-I am able to discuss this subject only from the clinical standpoint, having done no pathological work along this line. From the clinical standpoint I am satisfied of this-that there is a condition which has been described by the pathologist as otosclerosis, or, more properly, spongifying of the labyrinth, which is an internal ear disease, and not in any way connected with a middle-ear condition. We are all satisfied that there is a middle-ear catarrh, due to closure of the Eustachian tube or some other influence within the nasal cavity, which is purely and simply a middle-ear disease, that it may involve the internal ear, but is a separate and distinct disease from the condition called spongifying of the labyrinth. It is not difficult to distinguish between the two clinically when they are independent. There is also a condition in which we find the two combined and it is impossible for any man, with the known methods of examination, to say which is which or which is the predominating factor in the condition. So we must be careful in our examination, careful in our diagnosis, careful to draw the correct conclusions from the symptoms

found, and I think the sooner we get away from the idea that otosclerosis is the result of chronic catarrhal otitis media the faster progress we will make.

Dr. Stucky:-I think Dr. Bryant's essay has given us a correct clinical picture of the interstitial otitis media-what we formerly called hyperplastic otitis media-and his theory as to the relation of this to otosclerosis from a clinical standpoint, I confess, has some attraction for We thrashed this subject over, I think, seven years ago at the meeting of the section of the Triological Society in Chicago, and we have not advanced much. Clinically we have moved, but from a pathological standpoint we still know very little about the real otosclerosis. Now, Dr. Andrews has said what I intended to say about these two diseases—one is frequent, the other is rare; one is amenable, to a varying degree, to treatment, the other, so far as my experience goes, is not. Now, whether Dr. Bryant's conclusions about the primary, secondary and tertiary forms of the congestive; adhesive and degenerative form is correct, I do not know; that appeals to me. He did not mention the treatment. It does not matter now whether it is a hyperplastic or interstitial condition, or whether it is a beginning otosclerosis-the treatment he suggests, I think, is the correct one. The local treatment-equalizing the circulation, removing what happens to be in the nasopharynx that interferes with free ventilation and drainage of the middle-ear cavity, and then the systemic treatment. Now, I think the local treatment is often overdone, and we keep up the condition we want to get rid of. If the Eustachian tube is patulous, if the ossicles are not drawn down, and if the drum membrane is not retracted, that is an ear for scientific neglect. I think I have done too much surgery in the nose sometimes, and I no longer rim out the nasopharyngeal cavity as if it were a gun barrel. We do not agree on the systemic treatment. Question these patients carefully, and you find that they have a rheumatic or lithemic tendency-you get a positive answer. Correct that faulty metabolism. Give them rheumatic treatment, and you will get results that will surprise you, and I believe, as I have said before, that the systemic treatment of these conditions is just as important as the local treatment. Dr. Bryant did not mention the vibratory massage of the 1/8-in. stroke around the ear. That equalizes the circulation. I think the pneumo-massage within the canal is injurious. But we do not yet know what otosclerosis is, or spongifying of the labyrinth.

Dr. Beck:—I really feel a little clearness on this subject which I did not have even as late as two years ago, and when I look over my discussion on this point, when Dr. Holinger first brought this subject to our attention in this country, I know I could not say anything now as I did then. From hearing these discussions I am certain the gentlemen are not at all certain on the points. For instance, this point is clear, that the functional tests are of the utmost importance, and without them there is no diagnosis possible. The three main symptoms—loss of hearing, normal drum, prolonged bone conduction, and nothing the matter with the nose or throat, we must consider as important. The pathology has been described by Dencker, Liebenmann and others. Why we do not see more of the pathology in this country is because we do not have access to the cases; we do not make postmortems.

Now, so far as the discussion as to treating the cases: Any irritation to the nose or throat is a deleterious matter. If Dr. Bryant means to imply an otosclerosis secondary to chronic catarrhal otitis media, I am in accord with him. Why should not we have an inflammatory connection with the middle ear? There are vascular connections, and I do believe

that a large number of the cases have secondary involvement of the labyrinth. If we could stick to the name spongification of the labyrinth, we would have no such discussion as we have to-day. If Dr. Bryant means otosclerosis secondary to middle-ear disease—to imply spongification of the bony capsule of the labyrinth—he is wrong, and the treatment is an entirely different thing of one and the other. We find these cases of spongification in young women particularly and in family groups. We find they have tone islands of deafness, and without these particular tuning-fork tests we will not make our diagnosis. There is no local treatment. Phosphorus and potassium iodid have been recommended, but the cases will

gradually grow worse, in spite of everything that may be done.

DR. BRYANT (closing the discussion) :- I have not had the opportunity of making complete serial sections which, with Dr. Holinger, I wish I had. The tuning-fork tests in these cases were not carried out as far as Dr. Holinger would have done, but the upper and lower tone limit only were ascertained. Referring to Dr. Beck's remarks, I only wished to take up in this paper the cases that have been called secondary otosclerosis; that is, the otoselerosis occurring with some change of the tympanic cavity. Of course, we have cases of otosclerosis—rarefying osteitis—where the bone changes are a long distance from the middle ear, and there is no apparent connection whatever. But in other cases there is a possible connection, which, I think, is the rule in the cases we see in clinic. No differential diagnosis is attempted in these cases; merely the symptoms are given, but a number of cases are included, which I believe showed all the classical symptoms of otosclerosis, and would admit of no other diagnosis from a clinical point of view. The paper is based entirely on clinical experience, and, therefore, of course, is subject to a great deal of scientific inaccuracy. On the other hand, it is the result of over twenty years of careful clinical observation. I have never changed my opinion that the congestion of the promontory could be controlled through the nasopharynx since my attention was called to the fact. This congestion, as is well known, is shown in many of the cases of otosclerosis by a pink promontory.

WIDENING OF THE PALATAL ARCH; ITS INFLUENCE ON THE NOSE AND NASOPHARYNX.

L. W. DEAN, M.S., M.D. IOWA CITY, IOWA.

The relation between nasal obstruction and malformation of the jaws with irregularities of the teeth has been long considered by both the medical and dental professions.

The influence of nasal obstruction with the resultant mouth breathing upon deformities of the jaw is so well known that we need not discuss it. The following is not so frequently mentioned, but, I believe, is almost as important.

Not only is nasal obstruction the greatest and most pregnant cause of malocclusion of the teeth, but malocclusion, which is usually identical with undeveloped maxillary part of the nose, in turn increases nasal deformity, usually increasing the nasal obstruction. We have the cause nasal obstruction producing an effect, malocclusion, and the effect increasing the cause. The impact of the force of mastication is one of the greatest factors in the growth of the jaws principally, and of all the facial bones below the orbits secondarily.

The influence of proper occlusion on the development of the nose has been demonstrated in many cases where tooth irregularities have been corrected early by the increased development of the sinuses and other structures of the nose that have been arrested in development.

In cases of malocclusion where proper occlusion has been produced the arch of the maxillæ continues to widen for several years after the work has been completed, and the nares also widened.¹

I have found so little in our text books that would suggest that in relieving nasal obstruction the deformities of the jaws should be corrected that I have selected this topic. For several years I have been using the orthodontist in many of my cases of nasal obstruction in children, with many satisfactory results, at least so far as saving turbinate tissue is concerned.

There can be no question as to the advisability of saving this tissue when possible. The wonderful change in the general condition of children, the increased stability of the nervous system, the

^{1.} Angle: Items of Interest, vol. xxvi, No. 11.

increased strength and resistance, the better resting at night, which so often follows orthodontic procedures, I am not sure is not dependent in part upon increased nasal respiration. If we watch the dental journals we will see reports of cases by reliable men, where intranasal work has not produced good nasal respiration and the widening of the palatal arch has done so. Dr. Watson² says as the result of expanding the arch, in four months easy nasal breathing was produced, and the facial expression of the patient was changed.

I have a patient under observation now where after removing adenoids five years ago there was still poor nasal respiration. The trouble was due to imperfect development of the nose and I did not wish to do any intranasal work. The widening of the palatal arch was advised; this was not done for two years. During this time there was no improvement in nasal breathing, then the arch was widened, one-half inch. Now, three years after, there is good nasal breathing. I am simply mentioning these things to show the importance of this subject.

There is such an intimate relation between obstructive lesions in the nose and the palatal arch in many cases that I am sure we can not properly correct one without work on the other. It is a well known fact among the dentists that orthodontic work can not be successfully done if postnasal obstruction is present. It is not necessary that perfect nasal respiration be established before this work is done. It is better not to operate on structures that might be so influenced by orthodontic procedures as to make operation unnecessary.

Dr. Bryant³ says the course of treatment to pursue if nasal breathing can be maintained, is to straighten the teeth first and operate on the nose later if necessary. If nasal breathing can not be maintained, operate on the air passage sufficiently to allow nasal breathing before regulating the teeth. Then regulate the teeth, and, last of all, do the final work on the nose if any further work is required; this has been the course of treatment followed by myself.

Not in all cases do we find nasal troubles that need treatment before orthodontic procedures are resorted to. Contracted arch and irregularities of the teeth are caused by many other conditions. Constitutional disturbances, early loss of deciduous teeth, early extraction of permanent teeth, may produce malocclusion with imperfect development of the nose and obstruction of the nares.

Items of Interest, vol. xxvl, November, p. 867.
 Jour, Am. Med. Assn., Jan. 25, 1908.

Debilitating acute diseases in children are noticeably followed by sudden undergrowth of bone. This process affecting the bone accounts for a certain proportion of these cases of pneumonia and measles, followed by dental irregularities and maxillary deformities.⁴

The deformity usually commences at the sixth year and ends by the twelfth.⁴ In such cases we may have normal or nearly normal turbinates, marked or only slightly deviated septa, postnasal obstruction or no postnasal obstruction. We see many such cases where I think no operative procedure on the nose is indicated. I can think of one marked case, 50 years of age, where nasal respiration is said never to have been good, and the intranasal structures are still almost normal. This patient is, of course, too old for widening the arch, but I know she could have received marked benefit if she had been properly treated during her early youth. In these and similar cases, surely the only rational therapy is to widen the nose by widening the palatal arch.

A most serious difficulty with me in attempting to follow out my ideas is to get the deformities of the jaws corrected. After almost every adenoid operation in young children, I refer the patients to the family dentist. I do not believe that more than one out of twenty cases referred to dentists by me have this work done. I believe it is more often the dentist's fault than the parents of the patient, because many of them do not wish to do this work. This, in my mind, is a most regretable situation. While the child may not be apparently suffering from the effects of malocclusion, yet the change is slowly but surely going on.

Later in life when the patient is old enough to realize the defect, the time for correcting it is past. I believe this condition can only be remedied by a certain amount of education of the people. The adoption of more simple methods for this work by the dentists would certainly help very much.

Accompanying most cases of contracted arch we find a markedly deviated septum. Dr. Black, in a paper presented before the Section of Stomatology at the American Medical Association at Chicago in 1908, mentioned that he had secured great improvement in straightening the septum by widening the arch. I have not been fortunate enough to secure such results. As the floor of the nose is lowered, it seems as if we should be justified in expecting such results.

^{4.} Talbott: Irregularities of the Teeth.

The time at which this work should be done is a most important thing. Rhinologists, dentists and orthodontists must learn to recognize initial stages of nasal obstruction and deformed dental arches so as to be able to correct these conditions during the developmental period of the individual, and thus aid Nature in her effort to develop a being fit to endure in the struggle for existence.

If we fail to recognize these conditions during the developmental stage of life we are often induced against our better judgment to jeopardize our peace of mind by attempting to break up some well established deformities at a time when the growth of organs is practically complete and repair slow. The work should be undertaken at the earliest possible developmental period. The success of such procedure diminishes just as the age increases.

In widening the palatal arch I believe the nasal fossæ are increased in size in two ways. First, directly by the increase in the width of the floor of the nose; that this does happen, I will attempt to show later. Secondly, by stimulating development in parts that have been arrested in development.

The nose can, at least in some cases, be widened up to the age of 26 years, because I have seen it done. We do not get the beneficial results at fhis age that we do if the work is done early, because arrested development will not be overcome.

As to just what procedure should be adopted in widening the arch, I do not consider myself as justified in deciding; the dentists must decide that question. We have recommended the method of Angle, the coffin plate, the jack screw and the wedge plate. The latter three act by separating the maxillary suture, the first by widening the arch, without separating the suture. Advocates of the jack screw and wedge plate claim to widen the arch in two or three weeks. The method of Angle requires months.

Some use a combination of Angle's method with one of the other methods. In all the methods expansion pressure is exerted on a yielding arch. During the last six months I have tried various methods for measuring the cavities of the nose before and after widening the palatal arch; I have so far been unable to make reliable measurements on the living subject.

Wishing to ascertain the actual change that may be made in the osseous walls of the nose itself by a widening of the palatal arch, I asked Dr. G. V. I. Brown, of Milwaukee, to widen the arch of a green skull. I made the following measurements before and after widening:

1. Distance across the posterior nares just posterior to the inferior turbinate, before, 32 mm.; after, 34 mm.

- 2. Distance across the posterior nares just above the posterior ends of the middle turbinates, before, 32 mm.; after, 34½ mm.
- 3. Distance from the vomer to the outer wall of the nose in the posterior nares one-half way from the posterior end of the inferior turbinate to the floor of the nose on the left side, before, 17 mm.; after, 18½ mm.
- 4. Same measurement on the right side, before, 20 mm.; after, 24 mm.
- 5. Distance between the anterior attachment of inferior turbinate in inferior portion of the middle meatus of the same point on the opposite side, before, 23 mm.; after, 25 mm.
- 6. Distance between vomer and inferior turbinate at narrowest part of the inferior meatus, left, before, 6 mm.; after, 7 mm.
- 7. Same measurement, right, before, 8 mm.; after, 9 mm. Dr. Brown uses the jack screw. He has done exactly the same thing on several of my patients as on this green skull. The screw is turned until a space appears between the central incisors the size of the lead in a pencil. Exactly the same process was used in preparing this skull. If the suture is held open there should be in two weeks a deposit of bone that will keep the arch widened.

I have a photograph of one of Dr. Black's cases where the incisors have been so separated. In living patients this separation has been demonstrated by sticking pins through the suture.

The above measurements demonstrate to a certainty that a decided increase in the nares can be produced by widening the arch. In the living subject much more can be done than has been done with this skull. One of my patients has had the arch widened three-quarters of an inch and the roof of the mouth lowered materially.

We must remember that not only do we get benefit by the direct action of widening the arch, but producing perfect occlusion will increase the development of all the bones beneath the orbit.

DISCUSSION.

Dr. Bryant:—I want to thank Dr. Dean for this interesting and very thorough paper on what seems to me to be the most important subject that has come before us during the last few years. I thoroughly coincide with what Dr. Dean has said, although my experience has not been so extensive. I have been able to get some measurements of the nasal fossæ before and after regulation of the teeth, and find that there is a considerable immediate improvement, and a much greater subsequent improvement in the caliber of the nasal fossæ. I have had two cases—girls about 16—where there was no irregularity of the nose, merely an approximation of the outer and inner walls of the nasal fossæ. The separation of the teeth widened those nasal fossæ immediately, and from having forced mouth-breathing the respiration changed spontaneously to

the natural way. Children's teeth, as soon as they appear, should be looked after, and especially just before and at the time of eruption of the permanent teeth. Sufficient spaces between the teeth should be provided to give space enough for the permanent teeth without crowding. If the spaces between the deciduous teeth have not enlarged, the teeth should be separated at once. For perfect nasal respiration it is as important the posterior teeth should be regulated as the anterior. I have been told by my best adviser in orthodontia, Dr. E. A. Bogue, that the position of the posterior molars governs the size of the posterior nares, just as the anterior teeth govern the size of the anterior nares. I do not know whether Dr. Dean brought out the point why the teeth prevent the growth of the nose. The fact is the permanent teeth lock and will not separate, and the structures above are held as if compressed by a band.

Dr. Lewis:-I want to report a case which Dr. Brown, of Milwaukee, has recently taken care of for me. A young man, aged 19 years, had a very bad nasal obstruction for many years; he underwent a very unsuccessful Asch operation, which only served to increase his nasal stenosis. He then came to me with request for help. A very high gothic arch and irregularities of the teeth showed at once the cause of his original stenosis, and the scars and general condition of the septum showed the reason underlying the present exacerbation of the trouble. I decided upon widening the palatal arch and sent him to Dr. Brown. In eight days I received a communication from the patient, saying the side of the nose through which he had not been able to breathe was already open to respiration. About eight weeks after this widening operation his whole facial expression had changed remarkably. He was wearing the plate which Dr. Brown uses, and had secured five-eighths-inch widening of the upper jaw, and I think he is going to be well of his stenosis without any intranasal procedure whatever.

One other point: In discussing this subject with Dr. Brown, of Milwaukee, he told me that he had successfully widened the arch in a patient as old as 52 years.

DR. MYRON METZENBAUM:—To me this paper is a most important one, for I read a similar paper before the Ohio State Medical Association in 1907. When a child has protruding teeth it is a physical impossibility for it to close its lips and mouth, and, therefore, it must breathe through the open mouth. If the child has enlarged tonsils and adenoids, these should be removed before the orthodontist does his work. In the child and young adult, the orthodontist can widen the arch so that all the permanent teeth will have room to come in place in their regular order and form. This will give a harmony of the upper and lower teeth, so that mastication may be performed perfectly, and perfect mastication, of course, will aid the child in its general development. It will widen the arch, which will widen the nares, and it will lower the vault of the palate, which will lower the floor of the nares. These two factors will increase the dimensions of the anterior nasal canals, thereby making nasal breathing more possible.

Dr. Baldwin:—I am very much interested in this subject, because I have been working on it a great many years. I read a paper at the fifty-third annual meeting of the American Medical Association and also one before the Pennsylvania Society of Dental Surgeons some few years back. I believe we are progressing to some extent in getting the general practitioner and specialists to understand that there is room for the work. But there are many physicians and dentists who will not urge the matter to the patients. They say it is of no special importance and that little, if anything, will be gained. Those who have paid the most attention to it

realize the great benefit to be derived. Some cases under my observation one in particular who was under the care of a Boston dentist, who had been trying for some months to get the jaw to maintain its correction and, finally, told the parents of the patient that it was absolutely necessary to have the deformity in the nasal septum corrected before he could keep the correction he was able to give. In that case I corrected the septum a year The dentist insisted in keeping on his apparatus for about six months, took off a part of it, and a few weeks ago told them that the remaining portion could be removed. The septum and jaw are both in perfect condition. It seems to me that we ought always to do the work with the jaw first, as it may make less necessary on the septum. Of course, remove the adenoids and tonsils first of all. If you are doing any cleft-palate work, and there is not proper occlusion, have your dentist get the best possible before you attempt to work on the palate. Cases of cleft palate will come to you in adult life, at least after dentition is complete, and in such it is very important that you have the jaw corrected before you attempt to do anything with the palate.

Dr. Holinger:—This is certainly a step in the right direction and has an absolutely logical conclusion, because with the high arch you have the parts above the arch—septum—pushed up against the base of the skull. A flatter arch will increase that distance and have a tendency to straighten the septum. At the same time it widens the distance between the two rows of teeth. There are any number of statistics of measurements of this region which have been made very accurately; the doctor will find them described in Arch. f. Laryngologie of 1896. The measurements were made in large numbers in order to determine the width of the nose in ozena. It was shown that the ozena nose is a wide nose or rather wider than the average nose.

Now, as to the remedy that Nature has provided for this, I think we owe it to our advanced civilization that we have a larger number of these cases than there were before, because formerly our food in the more natural state was much harder and much tougher, and the muscles of the jaws and teeth had to be used to a much greater extent and with greater force than now. It is rather exceptional that we get the tough vegetables that the original members of the human family were supposed to use. Dr. Senn's book on Greenland has drawn my attention to these peculiarities. The Greenlanders cut the skins of the seal and walrus in strips to make straps of them. These straps would be hard if they were used as they are, and, therefore, the women and children have to chew them until they are soft. In this work they use their jaws and muscles of the jaws to such an extent that the correction that Dr. Dean spoke of in his paper is automatically produced. All the other disadvantages that can work on these parts and to which we usually ascribe the etiology of mouth-breathing, colds and catarrh, are certainly present in the Greenlanders. hygienic conditions are miserable. Dr. Senn tries to describe the stench that exists in the huts of those people from the overcrowding of space with humanity and all kinds of refuse. Still they have wide noses, normal noses, and he never heard anything about colds, pneumonia, etc. He also says that the teeth, without exception, are faultless in the Greenlanders, even up to 75 and 80 years of age.

Dr. Dean (closing the discussion):—I am not an orthodontist. Dr. Brown, of Milwaukee, says that Nature looks after the regulation of the teeth after the widening of the maxilla, and the inferior jaw occur. Dr. Ottelengui, of New York, widens the suture, and then he uses this statement; he says it might be possible, but he has never seen it

Angle's method on the lower jaw and also to regulate the teeth on the

upper jaw, after widening the suture.

Dr. Holinger spoke of measuring the nose. I tried that, and the reason I did not attempt to report results is because, by the use of various septometers and instruments that could be devised, I could not get a constant series of measurements to start with. I tried cocainizing the nose and used adrenalin, and then we had an instrument made that would penetrate the soft tissues down to the bone, but my measurements were not constant and consequently I could not base any conclusions on them.

OBSERVATIONS ON SURGERY OF THE THROAT AND NECK.

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BY INVITATION.

It was with great pleasure I accepted the invitation to present a paper before this society, and I am glad of the opportunity of expressing the appreciation of the general surgeon for the specialist. We owe you a heavy debt and are under obligations to you for many valuable lessons given by your various branches. I am uncertain, however, whether I can interest you as a whole because of these different branches. I have chosen a general subject which, in a way, relates to your specialized subjects—the treatment of cancer.

Among the recognized precancer stages, that of benign tumors is frequently encountered. The transformation of a benign into a malignant tumor is markedly facilitated by traumation. The type of trauma one most frequently encounters is incident to incomplete removal, especially by methods that crush the remaining portion. The snaring and gouging of fibromata or angiomata of the nares or nasopharynx may hasten this conversion into sarcomata. May not the snaring, cutting and cauterizing of papillomata of the larynx convert such tumors into cancers in the same way that senile warts and moles of the skin, papillomata of the bladder, adenomata of the large intestine are so converted by incomplete surgical treatment? The present attitude of the general surgeon toward benign tumors is that they should either be totally removed or let alone. A nasopharyngeal fibroma is a potential sarcoma; a laryngeal papilloma, a potential carcinoma. Should they not, therefore, be approached surgically with corresponding consideration? That is to say, complete and wide incision? A benign tumor that reappears at the site of its supposed removal, by that token alone, partakes of the quality of malignancy. The power of endless cell division is the characteristic of cancer, though the source of this power is not known. Therefore, as soon as the cells of a hitherto innocent tumor take on an increased rate of growth, the rate increasing somewhat in a geometric ratio, the most fundamental characteristic of cancer is manifested. The microscope at

this stage may not give the characteristic morphologic picture, but later such picture will almost certainly appear. That is to say, the early pathologic physiology of the growth is quite as diagnostic of malignancy as the later pathologic anatomy.

When the diagnosis of cancer has been established in the nose, throat or larynx, can the operable stage with reasonable certainty be established? This may be one of the most difficult problems—a problem which can be best solved by the individual, based upon his knowledge and experience. While the decision for or against a given case must be individualized, the technic may, in a measure, be generalized. The immediate as well as the final result has a close relation to the control of hemorrhage, the prevention of shock, the placing of the line of excision in healthy tissue at a safe distance from the growth, not handling the cancer tissue, and to infection.

In the main, shock producing factors are anesthetic accidents, hemorrhage, cardio-inhibitory reflexes, and rough contact.

It is now well known that the immediate and perhaps the most important factor in the causation of broncho-pulmonary infection in operations within the mouth, is the inspiration of blood at the time of operation. This may be absolutely prevented by the adoption of a simple method heretofore described by me in the Annals of Surgery. The method consists of passing closely fitting rubber tubes through the nares into the pharynx, opposite the epiglottis, then close gauze packing of the pharvnx, after drawing the tongue well forward. With the exception of operations requiring the removal of the entire base of the tongue, complete control of the blood inhalation is thereby accomplished. Incidentally, this separates the surgeon and the anesthetizer, permitting each to do his work unhampered by the other. Mucus that might otherwise collect in the throat is absorbed at once by the gauze packing. The prevention of vomiting is almost wholly under the control of an even anesthesia. The many other features of the prevention of infection will not be here considered.

The control of hemorrhage is important on its own account and almost equally on account of the maintenance of a dry field, affording opportunity for a clean and precise dissection. The arterial hemorrhage is best controlled by temporary closure of the common or external carotid artery. Permanent closure of the common carotid, on account of the high percentage of cerebral softening in the cancer period of life, should be avoided. Permanent closure of the external carotid, while it is not attended by this risk, carries

with it approximately a 2 per cent. mortality rate from the washing away of the thrombus of the ligatured stump, causing cerebral embolism. At all events it is unnecessary. In more than one hundred cases I have temporarily closed the common or the external carotid without immediate or remote complications. closure of this vessel should be attended with little more risk of thrombosis or embolism than closure of peripheral trunks by tourniquet or by pressure applied upon the skin. This part of the technic must be done with absolute gentleness, the lumen merely closed, the walls not compressed. The troublesome venous hemorrhage may be minimized by placing the patient in the partial upright posture with a sufficient even pressure upon the lower extremities and the trunk, up to the costal borders, to prevent gravitation of blood. Probably the most convenient means of accomplishing this is by the rubber pneumatic suit. By this device almost any posture may be assumed without serious risk of cerebral anemia by gravity. It is interesting to note the collapse of the veins as the patient is taken from the horizontal to the head-up inclined posture. In atheromatous subjects, presenting a high blood pressure, I have seen marked hemorrhage, even pulsating hemorrhage, from the branches of the external carotid when the common carotid was closed. This is easily demonstrated to be due to the passing of the blood of the opposite artery through the vein, causing a reverse stream through the internal carotid of the clamped side to the bifurcation of the common, then up the external carotid, causing pulsating hemorrhage from the branches of the latter. When this occurs, as soon as the external has been exposed, its lumen may be closed by clamp, thereby ending the reverse as well as the direct stream of blood.

The prevention of cardio-inhibitory reflexes which may occur as a result of traumatism of the superior laryngeal nerve, the vagus, or the laryngeal mucosa, may be obviated by a preliminary hypodermic injection of atropin, by the cocainization of the laryngeal mucosa, or the superior laryngeal nerve trunk, and, so far as possible, by avoiding contact. Sharp dissection, minimum retraction, and sponge contact have happily reduced technic of the extraction of a tooth. I have not seen a single case of death from shock in the last more than three hundred operations on the neck and face.

Operations on the larynx, by reason of the rich supply of inhibitory terminals of the superior laryngeal nerve, present special problems. Intubation, laryngotomy for foreign bodies, intralaryngeal manipulations, or laryngeetomies, may be done without risk of collapse, provided a sufficient dose of atropin be previously given; and further, that the laryngeal mucosa be cocainized. In laryngotomy (an operation to be avoided so far as possible) after the incision has been carried through the cartilage to the mucosa, the latter may be readily cocainized by means of a hypodermic syringe along the entire line of the proposed opening. The larynx may then be entered without producing cough or even an altered respiratory rhythm. Through this opening, then, the laryngeal mucosa may be cocainized by a spray or swab, and a quiescent larynx obtained.

Some years ago, while interested in intubation for laryngeal stenosis in diphtheria, I encountered cases of sudden collapse with arrest of respiration. At first I erroneously supposed it to be obstruction due to forcing membrane down ahead of the tube. In my efforts to extract the supposedly obstructing membranes I made death doubly sure.

Upon investigating this subject in the laboratory it was at once observed (1) that reflex inhibitions could entirely account for all the symptoms, and (2) that the respiratory mechanism never yields instantly to obstruction, but makes a struggle with increasing respiratory force, bringing into play all the extraordinary muscles of respiration until either the obstruction is overcome or death ends it. At a later time I was able to verify in two cases the correctness of this view, as follows: Children in desperate straits were intubated as quickly as possible. If sudden collapse with failure of respiration and disappearance of pulse from the wrist quickly followed, the child was at once inverted, head-down, with his back resting against my knees, an assistant holding his feet, while I pressed rhythmically and rapidly upon the thorax over the heart. There quickly appeared a slow cardiac rhythm, gradually becoming more rapid, finally reaching a safe status, followed by spontaneous respiration and complete recovery. In 210 intubations I encountered two deaths from reflex inhibition and a number of temporary depressions, all clearly due to the direct stimulation of the terminals of the superior larvngeal nerve in the larvnx, and had I understood the cause they could have been prevented. Nerve endings having the power of producing inhibition are by no means confined to the larvngeal mucosa. The rima glottidis is also sensitive and may respond to such impulses. The posterior nares, though to a less degree, may exhibit such response to trauma. In operations for adenoids, these reflexes should be borne in mind. I have no doubt that sudden depressions occasionally attributed to the anesthetic were, in fact, reflex inhibitions from the operative trauma. In performing these operations I always cocainize the pharynx and give a preliminary injection of atropin.

The subject of hemorrhage is a very live one to every surgeon. In the first place, I think it is a matter of great importance to know more definitely what quantity of blood may with safety be lost. It was found that each individual animal had a marked idiosyncracy in that the total amount of blood it could lose and yet live varied considerably. Some animals could lose six-tenths of the total quantity and recover, while others, apparently of the same type, died after losing four-tenths. The natural power of compensation is very considerable, and if the hemorrhage is slow a very considerable amount of blood may be shed before the blood pressure is materially affected. When, however, the compensating mechanism has become overtaxed, depression may rapidly appear and amount to collapse.

It is a well established fact in physiology that animals may lose between 2 and 3 per cent. of their body weight of blood before there is any appreciable change in the circulation. The reason for this is that the vasomotor center, which to such a large degree governs the circulation, is able to compensate for the loss. During the hemorrhage this center sends out impulses, and the blood vessels contract over various parts of the body, thereby keeping up the pressure and pulse volume. This seems to me to have an extremely practical bearing.

It is, therefore, difficult to determine how far from the limit of compensatory action the circulation is at any given time. A patient having lost an unknown quantity of blood may appear to be a good risk for an operation, but the effect of the anesthesia and the shock, added to the already overworked vasomotor mechanism, may be sufficient to cause a dangerous collapse. The practical point to be drawn from this is, that it is important to know how much blood has been lost before an operation is begun. A patient may lose a certain amount of blood when in the normal state without detriment, but if he be in a condition of shock at the time the hemorrhage occurs the case becomes much more serious, as the vasomotor center is partially impaired by the shock and the normal amount of compensation can not occur. If a patient has lost much blood, he can not endure much shock; and if he is in shock he can not endure much hemorrhage. In operations, if there is a minimum of shock, the patient may endure a maximum of hemorrhage, and vice versa. As a rule, hemorrhage is more easily prevented than shock.

The employment of posture, bandaging, saline infusions, heat, stimulants, etc., is so well established that little need be said upon these subjects. There is one phase of the question of stimulation that may be further discussed, viz., the modifying effect of the anemia.

In the experiments it was found that giving a dog a dose of strychnin sufficient to cause convulsions (usually a larger dose than in the normal was required), no matter how large the dose and how severe the convulsions, they could be controlled by sufficient bleeding. But if the blood pressure in the same animal were raised either by transfusion of blood or by saline infusion the convulsions would appear again and become as severe as ever.

This experiment has two practical bearings: (1) in hemorrhage, a larger dose of strychnin is needed to affect the vasomotor center, and (2) the effect of strychnin is greatly increased by first raising the blood pressure and then giving the stimulant.

In a case of extreme hemorrhage, if saline infusion be given to raise the blood pressure even for a moment and strychnin then be given, the effect will be multiplied. On the other hand, one must be careful in giving heroic doses of strychnin to a patient with a very low blood pressure, as with the rising pressure bringing accentuation of the effect of strychnin, an overeffect may follow. The experiments showed that it is not safe to push digitalis in the presence of anemia, as the heart may be suddenly arrested.

The value of pressure upon the extremities and the abdomen is undoubted. To accomplish this the application of layers of cotton over the extremities and abdomen, over which broad bandages may be snugly applied in several layers, is important. The pneumatic suit is also of great value in giving a uniform pressure over this zone. In using saline infusions a certain amount of care is necessary. If the solution is too rapidly infused into an anemic, hence weakened heart, it may cause an acute dilation. Subcutaneous infusion does not present such dangers. Then again, saline solution, while valuable, has distinct limitations. It is at best only a poor substitute for real blood, and there comes a point in progressive hemorrhage at which there is not a sufficient number of red blood corpuseles left to carry a sufficient amount of oxygen consistent with life.

Our resources in treatment have a definite limitation. It is because of a realization of our limitations upon this subject that we started out to find new resources—starting with the promise that there is not enough blood in the body to sustain life, therefore, the only new treatment must bring more blood to the circulation.

In the first place it has been well established that the blood of individuals of the same species is isotonic with the blood of another individual of the same species, but that the blood of an individual of another species will affect unfavorably an individual of a different species. That is to say, if the blood of a rabbit were injected into a dog, that dog's blood and tissue would set up a certain reaction against it just as the tissues would set up a reaction against bacteria. The effect of the reaction of the dog's blood against the rabbit's blood would be that the dog would build up in his system certain materials that would be a defense against the rabbit's blood. Certain agglutinins and hemolysins may be produced when alien blood is transfused. It is apparent, then, that the loss of human blood must be met by replacing it with human blood. Our experiments sustained the view that in the same species the blood of one normal individual is interchangeable with that of another normal individual.

Clinically, I have found that the treatment of hemorrhage by transfusion is specific, provided it be done before the fatal histologic changes of anemia of the central nervous system occur. In a recent research on anemia of the central nervous system Dr. Dolley and I have found that blindness in almost every instance followed total anemia of seven minutes or more. In anemia for less than six minutes the blindness was usually only temporary.

There are a number of clinical instances reported of impaired or lost vision following hemorrhage.

The extraordinary susceptibility of the central nervous system to anemia is an added reason for the careful control of the circulation in surgical practice.

Finally, on behalf of my colleagues in general surgery, I desire to offer my tribute of praise of the brilliant work of your members in the various fields of special surgery.

CLINICAL DEMONSTRATIONS OF UPPER BRON-CHOSCOPY.

J. W. MURPHY, A.M., M.D. CINCINNATI, OHIO.

It is not my intention to enter into a discussion of my method, or any one particular method, for the removal of foreign bodies from the trachea or esophagus, but simply to give a clinical demonstration of the ease with which the trachea or esophagus may be examined for either diagnosis or the removal of foreign bodies. Upper bronchoscopy, by means of Dr. Jackson's split spatula, is comparatively easy and is soon destined to be a routine of office examinations. When the foreign body or diseased area is situated deep within the trachea or bronchi, the personal equation and experience of the operator will have much to do with the success of the operation.

In one of my cases recently of a button in the right bronchus of a young girl of 18 years old, while I had no difficulty in locating the foreign body, yet from the peculiar position in which it had arranged itself in the bronchus I was unable to grasp the button with my forceps so as to remove it. After two attempts, one under local anesthesia and one under chloroform, I decided to take the case to Pittsburg and have Dr. Jackson see it in consultation. He had very little difficulty in removing the obstruction.

A peculiarity of the case was that after my second attempt all symptoms of a foreign body disappeared and the patient and parents insisted that it was out. It was quite possible that the button might have been coughed up during the night and either unconsciously expectorated by the patient or swallowed into the stomach. I had great difficulty in persuading the parents to allow me to have Dr. Jackson see the case, since they were satisfied that the foreign body was out.

The wisdom of my course was quickly demonstrated when Dr. Jackson removed the button. We must never be satisfied in these cases until we are sure that the foreign body has been removed, since the history is that all of these cases prove fatal in two or three years.

In the case of a young woman whom I saw three years ago, with a pin in the right bronchus, clearly shown by the radiograph which I will show you (Fig. 1), but which I was unable to extract, even

after a tracheotomy had been done, I have only recently learned of her death and feel quite sure that the foreign body was a contributing cause.

I wish to emphasize very strongly the danger of leaving a foreign body in the respiratory tract. In the clinical demonstrations which I wish to make to-day it is important that the patient possesses a roomy and tolerant pharynx. Under thorough cocainization of the pharynx with an 8 per cent. solution of cocain it is possible to make a very minute examination by direct inspection of the pharynx, larynx and the upper portion of the trachea. Should it be necessary to examine the deeper portion of the trachea or bronchi, it is important that these parts be first cocainized with a 20 per cent.

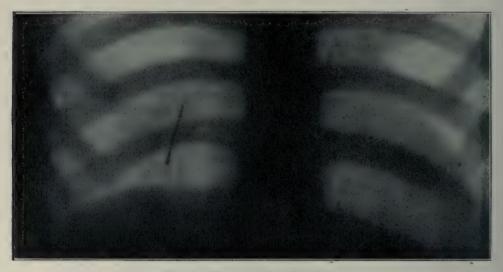


Fig. 1 .-- Pin in the right bronchus.

solution of cocain carried down on a gauze applicator, being careful not to have an excess of the solution on the gauze.

For upper bronchoscopy a mouth gag is not necessary, the tubular spatula of Dr. Jackson answering this purpose. The spatula is passed along the base of the tongue till the tip of the epiglottis is seen.

The spatula engages the upper third of the epiglottis and presses it firmly back against the base of the tongue. The assistant, sitting behind the patient and supporting the head, must now press the head forward, at the same time elevating the patient's chin so as to bring the upper teeth in line with the trachea. The handle of the spatula is now elevated quite sharply, when upon looking through

the tubular part of the spatula the arytenoids and posterior half of the larynx come into view.

Upon deep inspiration a very good view may be had of the arytenoids, vocal cords and the upper portion of the trachea. In order to lessen the reffex cough it is now well to cocainize the deeper portions of the trachea by means of a 20 per cent. solution of cocain.



Fig. 2.—Bronchi filled with shot showing the bifurcations, where foreign bodies may lodge.

The technic of upper bronchoscopy is not difficult to master, and once it has been acquired it is not difficult to learn to pass the esophagoscope. In the passage of the esophagoscope it is best to have the patient in a reclining position. The tubular spatula is not necessary, and the passage as far as the cricoid is made by the sense of touch. The index finger of the left hand engages the cricoid

cartilage, lifting it up and forward, thus exposing the entrance into the esophagus.

The esophagoscope, with the obturator in position, is held in the right hand much the same as you would grasp a billiard cue, and guided by the finger of the left hand the tube is made to enter the esophagus along the right pyriform sinus. No force is necessary and none should be used. As soon as the tube has passed below the cricoid the obturator is withdrawn, and the rest of the passage should be by direct inspection. The tube must be made to advance only as the lumen of the esophagus opens up ahead of the tube.

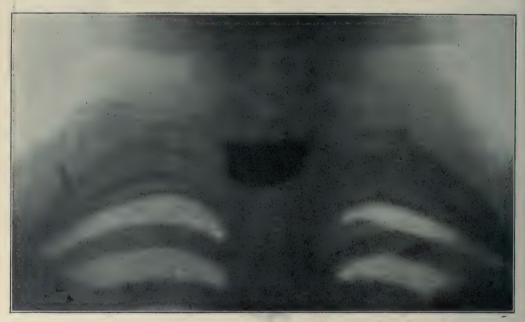


Fig. 3.—Stricture of the esophagus. The dark spot is a mixture of bismuth lodged just at the beginning of the stricture.

In developing the necessary technic of the passing of the tube and manipulating the forceps, I have had recourse to both the cadaver and the dog and must say that the latter is much more satisfactory. In the cadaver the tissues are not in their normal state and the postmortem rigidity of the muscles, especially the masseter, makes the process much more difficult than in the living. With the dog the conditions are very similar to what you will encounter on the living subject, the sections and color of the tissues are normal. The dog should not be too large, one the size of the average fox terrier being about the right size. One-half hour before

the anesthetic give him a hypodermic of one grain of morphin with one-hundredth of atropin. This will produce a stupor that renders him much easier to handle. Fasten him in a trough-like V-shaped frame with the head suspended over the end of the trough, with the mouth gag in position and the tongue drawn out slightly, the spatula being passed along the base of the tongue until the epiglottis comes into view. The upper third of the epiglottis is caught by the spatula and pressed back against the base of the tongue by elevating the handle of the spatula.

The arytenoids and posterior third of the glottic opening now come into view. As a deep inspiration is taken, fully two-thirds of the glottic opening is plainly to be seen. The glottic opening and trachea should now be cocainized before attempting to pass the bronchoscope, else there will be an annoying reflex cough to con-

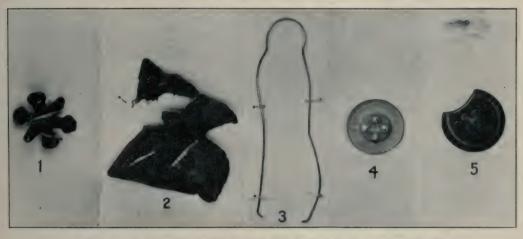


Fig. 4.—1. Jackstone removed from the esophagus of a 2-year-old child. 2. Veal cartilage removed from the esophagus of an adult. 3. Wire removed from the esophagus of a young lady, having pulled out a tonsil snare during the removal of a fibrous tonsil and was swallowed by the patient. 4. Button removed from the trachea of an 18-months child. 5. Button removed from right bronchus of an 18-year-old girl.

tend with. As soon as the cocain has taken effect the bronchoscope can easily be passed through the glottic opening during inspiration, when the spatula is removed and the trachea and bronchi easily explored. The technic is not especially difficult and can be easily acquired on the dog. In examining the esophagus the split spatula can be used but is not necessary. The index finger of the left hand is passed into the pharynx and the epiglottis located, when the finger is passed downward and backward till the posterior portion of the cricoid cartilage is felt, when the whole larynx is elevated.

With the tube held lightly in the right hand, with the obturator in position, the tube is made to pass gently along the right pyriform sinus into the esophagus.

It should pass almost as easily as dropping a lead pencil into your vest pocket. If there is any resistance you are not in the right place or your tube is not directed properly. As soon as the end of the tube passes below the cricoid cartilage the obturator must be removed and the passage made by sight, the tube being pushed forward only as the esophagus opens ahead of the tube. As the region of the diaphragm is approached the animal will usually cry out, showing that this must be a very sensitive area. You can tell when the stomach is reached by the marked change in the color of the mucous membrane, the stomach being much more vascular, hence redder.

The whole technic of bronchoscopy and esophagoscopy can be easily acquired on the dog and also the duties of your assistants in holding the head and passing the instruments at the proper time. Much of your success will depend upon the competency of your assistants.

I wish to show several radiographs demonstrating the presence of foreign bodies in the bronchi, together with a picture of the bronchi filled with shot. Also a stricture of the esophagus taken after the patient had attempted to swallow a mixture of bismuth subnitrate.

CARCINOMA OF THE LARYNX; PARTIAL LARYN-GECTOMY. CLINICAL REPORT.

J. A. STUCKY, M.D. LEXINGTON, KY.

The first case I will report will be one of partial laryngectomy for carcinoma of the upper part of the trachea involving the larynx.

A man, aged 76, very hoarse for one year, an inveterate smoker, been under constant treatment for several years for larvngitis; unable to take a long breath, said he almost choked. Indirect larvngoscopy showed a small growth and it played up and down, much like a cork on water, but direct larvngoscopy with the tube showed the growth to be much larger and attached to the posterior wall of the left side of the larvnx, as I thought, below the cord. I attempted to remove it by the indirect method, but was unsuccessful. The growth would just bob up and down and I couldn't get hold of it. But on section I removed a part of it, and it proved to be carcinoma. I then decided to do a thyrotomy. A preliminary tracheotomy was done, and the anesthetic given without any trouble. I did not use rectal anesthesia, because of some bowel trouble: hemorrhoids, etc. After making my tracheotomy and introducing the tube, I found that I choked my patient, withdrew the tube immediately, and found that the tube protruded from the tracheal wound. I then enlarged my incision downward, and did a very low tracheotomy, and then opened the thyroid cartilage and found a growth-this is one-third of it-with a fan-shaped pedicle, which I dissected off. The opposite side, the upper four rings of the trachea were eroded, and there was also a little fissure in the esophagus, which probably accounted for the difficulty in swallowing on other occasions, and some hemorrhage. I also found that the right half of the cricoid and thyroid cartilage was softened, I supposed, from erosion. So I removed the softened parts of the upper four tracheal rings, and then the softened part of the cricoid and thyroid cartilage. The vocal cord on the right side was gone. The thyroid was stitched together with silkworm gut and the larvnx packed with iodoform gauze and allowed to remain twenty-four hours. Now, I show here a couple of drawings made by Mr. Davis-an embryotic doctor, brother of Dr. Davis, here-which shows two views of the larvnx two weeks after the operation. I

would say that the tracheotomy tube was left in six days. Now, the ventricular band which was left on the right side was dropped down, and the infiltration is all gone and is beginning to assume the appearance and shape of a vocal cord, and the man has a pretty fair voice.

CAVERNOUS SINUS THROMBOSIS.

This case is one of unusual interest, because the diagnosis was believed to be verified by postmortem. A young man, aged 18, who had a typical Kentucky mastoid trouble, and had been treated several weeks for remittent fever, walked into my office one afternoon with a temperature of 104 degrees, with a history of recurring ear trouble since childhood. He had a fluctuating tumor back of the left ear, and I sent him immediately to the hospital and had him prepared for operation. Within two hours after I saw him he was on the table. The usual incision was made; periosteal abscess at tip, three perforations in cortex, through which pus oozed, periosteum easily separated. Middle ear filled with cholesteotomatous material, with pus and granulations. Only remnant of malleus found, no incus. Small aditus ad antrum. process diploic, but soft and pustular. Tegmen antri showed a large fissure. One or two drachms of pus in middle fossa. Lower third of mastoid and tip soft, and inferior fossa contained pus. Pulse improved when pus was released from middle fossa. Sinus exposed for examination, found normal. Temperature at operation, 104.4; pulse, 146. Tube dressing in auditory canal, lower third posterior wound left open, loosely packed with iodoform gauze.

This young man pursued an irregular course. His temperature varied from 100 to 104, never lower than 100 degrees. There was the most obstinate constipation and sluggishness of peristalsis that I have even seen, and the largest quantity of fecal matter in the alimentary canal I have ever seen. We gave him large amounts of purgatives, and the fecal discharges were enormous. I was never able to thoroughly clean him out so that there were no evidences of indican in the urine. His appetite was good, his mind was perfectly clear, and on the eighth day he was up in a wheel chair. On the night of the eighth day he awoke with a pain in his eye, and the nurse used iced cloths, and twenty minutes after called me up and said that the boy's eye was protruding. I thought that was an exaggerated statement, and told her to continue the cloths. In twenty minutes she called me again, and said she wished I would come immediately. When I arrived—about an hour after

the pain first began—both eyes were protruding and presented the most hideous exophthalmos I have even seen. His mind was clear, the pulse good, but none of the symptoms usually ascribable to cavernous sinus thrombosis. There never was any trouble in the lateral sinus; no phlebitis, no swelling, no mental hebetude, there was no discharge from the wound. Consultation of the staff was held three hours after the pain came, and none of the staff had ever seen such a case. In just twenty-three hours after he had the pain he died.

Postmortem.—No external abnormality, except as above noted. Only opened the skull cavity. Moderate amount of dark fluid blood escaped when opened. Dura firmly adherent to bone along the anterior half of the median line, normal otherwise. Pia normal, except for two small areas of inflammation along the longitudinal fissure, involving parts of the superior frontal and anterior central gyri. This was an inflammation involving the pia and arachnoid and the cortex, but there was no suggestion of exudate. Left cavernous sinus filled with a firm clot, with a very small clot in the right cavernous sinus. Mastoid wound clean throughout.

This is the second case of cavernous sinus thrombosis I have ever seen, the first being that of Dr. Ellett, of Memphis, Tenn. Had I not seen that, I would have been in doubt as to this case. The temperature and respiratory curve are interesting. Both of these cases will be published in detail later on.

Dr. Stucky.—There was no suggestion of any meningitis, consequently there was no spinal puncture made. There was no sepsis in the wound, and so there was no reason for digging around and making an examination there. All the tests for typhoid fever were made, the family physician having suspected typhoid fever, and that was negative. The blood count was made several times, and the leukocytosis was enormous, polymorphonuclears showed 84 per cent. There were no chills at any time, and no evidence of a sinus thrombosis, simply the eye symptoms came on twenty-three hours before he died. The fundus, after he complained of the pain, was examined and there was a marked swelling of the disc.

I made my report entirely too brief. The examination of the pus found in the ear, when he first came to me, showed a mixed infection; staphylococci predominating, and a few streptococci; no influenza bacilli. Now, after the thrombosis showed up, a blood count was made, and showed leukocytosis of 19,600, polynuclear 84 per cent. Of course, we suspected the cerebral complications, but what could we have done? Would we have been

justified in doing Hartel's operation? There is one operation reported, and Wright's of Boston. Would we have been justified in making an incision and going in and attempting to relieve the thrombosis in that way? If we had even succeeded, what would we have accomplished by it? That is what I want to know. How to get at it? I could get into the jugular bulb, the lateral sinus, or the sigmoid. Now, tell me how to get at the cavernous. I am up against it.

HISTORY BY DR. STEDMAN.—Hugh Wright came to me on Monday suffering with lightning pains in his head, as he expressed it: said the pain began in his ear and extended all over his head; the ear was discharging from a hole in the drum. The discharge had been going on for about six months, having had an abscess about this long before he came to me. He said he often had earache, but by syringing his ear with warm water he was relieved; he had syringed it the morning before he came to me. His tongue was heavily coated, his breath fetid, but no fever, no appetite, and had not slept well the night before. I ordered him home, to bed, and gave him 3 grs. calomel followed by saline the next morning. I told him to use hot salt bag to relieve pain if his ear should pain, and to take 2½ grs. veronal, repeated in three hours, until relieved of pain, and to report to me. He has no pain or swelling over the mastoid region. He came the next morning and was so much better that he went to his work at the printing office.

I did not see him again for two days and then found him suffering greatly, his eyes congested, an anxious expression, decided swelling, with pain over the entire mastoid region. I immediately sent him to you. The morning he started he had a temperature of 102, but said he felt perfectly well the two days, but began to suffer the night before he came to you.

From Record Book.—Hugh Wright, aged 18, Versailles, Ky.—July 17, 1908.—Abscess in left ear since childhood, at intervals. Suffering very much for past two weeks or more. No discharge. Anemic. Temperature, 101 degrees.

Ear.—Swelling behind ear, mastoid periosteal abscess, swelling extending down neck along sterno-cleido muscle. Middle ear filled with granulations. Posterior superior wall sagging.

Nose.—Adenoid.

Throat.—Enlarged tonsils. Follicular tonsillitis.

Operation—Good Samaritan Hospital, 4 p. m., July 17, 1908. Drs. Redmon and W. Stucky. Usual incision. Periosteal abscess at tip, three perforations in cortex through which pus oozed, periosteum easily separated. Middle ear filled with cholesteatomatous material with pus and granulations. Only remnant of malleus found, no incus. Small aditus ad antrum. Mastoid process diploic, but soft and pustular. Tegmen antri, large fissure. One or two drams of pus in middle fossa. Lower third of mastoid and tip soft and inferior fossa contained pus. Pulse improved when pus was released from middle fossa. Sinus exposed for examination, found normal. Temperature at operation, 104.4; pulse, 146. Tube dressing in auditory canal, lower one-third posterior wound left open, loosely packed with iodoform gauze.

July 23, 1908.—Slight swelling of inner canthus of left eye at 3:30 a.m., edematous, in five minutes the eye began to bulge, continuing rapidly for one and a quarter hours; the lid could hardly be raised. When solution was put into the eyes, the left could scarcely be opened. Right eye was not affected during the night. After the eye swelled there was a watery discharge, spasmodic pains in one hour after swelling began.

9:45 a. m. Patient comfortable and conscious. Lids of both eyes swollen. Eyes protruding, ecchymosis, markedly increased tension, especially in left eye. Pupils react to light, pupils dilated, choked disc.

4:30 p. m. Blood count, leucocytes 19,600. Polynuclears, 84 per cent.

11:30 p. m. Pulse, 132; temperature, 102; respiration, 38. Respiration loud and jerky, "throaty," shallow, abdominal, Cheyne-Stokes.

Increased swelling of the eyelids, dark blue, cyanosis. Swelling of the face and lips. Sluggish capillary circulation in the fingers and toes. Conjunctiva protruding between the lids and strangulated. Pupils contracted and do not respond to light. Increased mental apathy and answers yes and no. Occasional tremor of feet and hands. Frequent groaning, but says nothing hurts him. In reply to question, says he wants to urinate, but can not. No distention of the bladder. Muttering. No stiffness of neck. No rigidity.

REPORT OF Dr. Spracue.—I first saw Hugh Wright at the Good Samaritan Hospital about 3 p. m., July 24. He was lying quietly in bed with the head of the bed elevated (of which he complained). Temperature was 104.4, pulse 138, regular and bounding. Skin was dry and flushed. There was slight ptosis of both eyes, with congestion and edema of both conjunctive, and of both lids. Also

moderate exophthalmos and dilatation of pupils of both sides. There was no distortion, phlebitis, swelling or other evidence of inflammation about neck or face. Speech perfect and movements of tongue normal. Mind clear and alert. He described the progress of his case from the beginning, emphasizing the point that he had no pain since the operation, but felt so terribly tired. Was very restless and when left to himself almost constantly muttered to himself, "Oh my, I am so tired."

DISCUSSION.

Dr. Beck:—Both of these very interesting cases are now open for discussion. As to the second case I would like to ask some questions. First, did you have an examination made of the fluid removed as to meningitis? Second, what was the nature of the infection? Third, what were your blood findings? And, fourth, as to the absence of chills, at least, I did not hear you mention anything about the chills. Since those are the cardinal symptoms in thrombosis, we must ask those questions..

Dr. Stucky:—There was no suggestion of any meningitis; consequently there was no spinal puncture made. There was no sepsis in the wound, and so there was no reason for digging around and making an examination there. All the tests for typhoid fever were made, the family physician having suspected typhoid fever, and that was negative. The blood count was made several times, and the leucocytosis was enormous, polymorphonuclears showed 84 per cent. There were no chills at any time, and no evidence of a sinus thrombosis; simply the eye symptoms came on 23 hours before he died. The fundus, after he complained of the pain, was examined, and there was a marked swelling of the fundus.

Dr. Dayton:—I simply wish to corroborate Dr. Stucky's observations upon the clearness of the mind in these cases. In a case in which I was unfortunate enough to be called into consultation, the patient's mind was clear almost up to her demise. I would also like to ask Dr. Stucky whether the left eye was the primary eye affected.

Dr. Stucky: -Yes, sir.

Dr. Dayton:—So it was in this case. The case was a lady, about 38, who had no ear trouble whatever, but had been suffering from what was diagnosed a grippal attack, and I was called in council three or four days after, owing to a chemosis with the exophthalmos that occurred in the left eye. I feared a thrombosis of the cavernous sinus and so stated, but inasmuch as there was no ear trouble, thinking I might be mistaken and that we were dealing with an orbital cellulitis, I made some deep incisions into the cellular tissue of the orbit without finding pus. It went on for probably 36 hours, when the other eye became chemosed, more slowly, however, than the left, and it never was as marked as in the left. But her mind remained clear almost up to three or four hours before her demise. To me it was an interesting case, because of the fact that I had always associated thrombosis of the cavernous sinus with some middle-ear suppuration, or a mastoiditis from middle-ear disease. We held no postmortem.

Dr. Beck:—The reason I asked these questions was this, that if you had a large polymorphonuclear count and had a papillitis, that certainly was suggestive of sinus thrombosis, especially of the cavernous. Another point is, the puncture of the spinal cord is not only made when there are symptoms of meningitis, but to show whether there was meningeal com-

plications without definite symptoms. Your postmortem showed some meningeal complications. I think the spinal puncture should never be neglected, as it is so simple. It is one of the most important diagnostic aids in intracranial complications, and should be done in all cases where we suspect, or want to exclude, meningeal complications. Now, as to making cultures. I simply call attention to this point because it helps to make out the nature of the primary infection.

Dr. Stucky:—I made my report entirely too brief. The examination of the pus found in the eye, when he first came to me, showed a mixed infection, staphylococci predominating, and a few streptococci; no influenza bacillus. Now, after the thrombosis showed up, a blood count was made, and showed leucocytosis of 19,600, polynuclears 84 per cent. Of course, we suspected the cerebral complications, but what could we have done? Would we have been justified in doing Hartel's operation? There is one operation reported, and Wright's, of Boston. Would we have been justified in making an incision and going in and attempting to relieve the thrombosis in that way? If we had even succeeded, what would we have accomplished by it? That is what I want to know. How to get at it? I could get into the jugular bulb, the lateral sinus, or the sigmoid. Now tell me how to get at the cavernous. I am up against it.

EXHIBITION OF INSTRUMENTS.

A NEW APPARATUS FOR ADMINISTERING NITROUS OXID AND OXYGEN, OR ETHER VAPOR AND AIR IN ANY DEFINITE MIXTURE, THE EXACT PERCENTAGES OF THE TWO CASES BEING UNDER THE IMMEDIATE CONTROL OF THE ANESTHETIST.

J. F. BYINGTON, M.D. BATTLE CREEK, MICH.

Hewitt, in the latest edition of his treatise on anesthetics published last year, says: "There is no form of anesthesia at present known which is so devoid of danger as that which results from nitrous oxid when administered with a sufficient percentage of oxygen to prevent all asphyxial complications." He came to this conclusion after employing this anesthesia himself 17,000 times without having cause for anxiety except in two or three cases "in which, owing to the percentage of oxygen having been insufficient, transient respiratory embarrassment arose, and in one case in which transient syncope, probably of reflex origin, took place." In the same chapter he also says: "The chief drawbacks to the use of definite mixtures of nitrous oxid and oxygen are (1) that they are difficult to prepare with accuracy and in sufficient quantities; (2) that different subjects require different percentages; and (3) that the proportion of oxygen can not be increased or decreased to meet the special conditions arising during the administration."

It was this statement which stimulated the author to devise an apparatus which would not only provide a sufficient quantity of these gases for a reasonably long anesthesia, but which would also deliver the gases in any desired definite mixture, the percentage of which would at all times be conveniently under the control of the anesthetist.

Hewitt and others have endeavored to accomplish this by employing tow rubber bags as reservoirs for the two gases and securing a mixture of the gases by a regulating stop-cock at the outlets of the two bags. The objection to this method is that the two rubber bags must be kept approximately under the same tension of gas, and hence inflated to the same degree; otherwise they do not mix the gases accurately.

In place of the two rubber bags the author employs a pair of small gasometers exactly alike in all dimensions. The gases are conducted from these two gasometers by two flexible tubes of equal dimensions, to the face mask, in which there is a regulating stopcock which delivers the two gases accurately mixed in any required



Fig. 1 .-- Anesthetic Apparatus.

proportion into the face mask. The accuracy of this regulating device may be very simply tested by noting the relative amount of fall of the two gas tanks during a given time. The apparatus shown in Figure 1 is adapted not only for administering nitrous oxid and oxygen in definite mixtures, but also for administering ether vapor and air in definite percentages.

The two anesthetics may at any time be conveniently changed, the one for the other without an interruption in the anesthetic. A

very convenient procedure, which is also agreeable to the patient, is to start with pure nitrous oxid, under which the patient loses consciousness within thirty seconds on the average. As soon as any cyanosis makes its appearance a small percentage of oxygen, 2 or 3 per cent., is allowed to mix with the nitrous oxid, and as the anesthetic progresses the oxygen may be increased to 6 or 8 per cent., or sufficient to prevent cyanosis or asphyxia. When quite profoundly under the anesthetic the nitrous oxid may be replaced by ether vapor and the oxygen by air. In all these changes the relative percentage of the two gases being used are under the immediate control of the anesthetist, who has merely to change the pointer on the face mask which indicates the percentages of the two gases.

The water in which the two gas tanks float is preferably made warm. This warms and moistens the anesthetic vapors prior to their inhalation, which is a very great advantage in the administration of ether, to prevent the bronchial catarrh and pneumonia which too often follow the administration of ether by the drop method. The continuous evaporation of ether has a very chilling effect on the vapor, and this can only be overcome by warming the ether vapor, rather than the ether fluid. The author fills the gasometer with water at 130 degrees F. and this keeps sufficiently warm for some hours thereafter.

In administering ether compressed air is used to vaporize the ether for one gasometer and to keep the other gasometer filled with air. The compressed air may be supplied from any of the usual sources. Its entrance to the gas tanks is regulated automatically and is allowed to enter in sufficient quantity to keep both gasometers filled. The automatic check valves are regulated by the rise and fall of the gasometers.

A simple apparatus (Fig. 2) has been made without the ether attachment, which is used for administering nitrous oxid and oxygen simply. No compressed air is required.

The advantages claimed for the apparatus are the following:

- 1. It delivers the two gases into the face mask with absolute uniformity of pressure and mixed in definite percentages. The exactness of these percentages can at all times be accurately tested by shutting the air supply off and noting the relative fall of the two gas tanks during a given time.
- 2. The relative proportion of the two gases is conveniently under the control of the anesthetist, the regulating device being on the face mask. The proportion of the two gases can be instantly changed to meet the requirements of the patient.

- 3. In administering ether the apparatus requires no attention except the introduction of a fresh supply of ether once in an hour or so. This may be done while the anesthesia is progressing, as the ether bottle can be cut off from communication with the gas tanks by a valve. There is sufficient gas in the tanks to continue the anesthesia until the connection with the ether bottle is restored.
- 4. Perhaps the greatest advantage of this apparatus over all other anesthetic apparatuses which mix gases definitely is the use of warm water in the gasometer tanks which warms and moistens



Figure 2.-Anesthetic Apparatus.

the gases. This prepares the gases much better for reception by the bronchial tubes. Respiratory spasm is much less likely to be excited and the bronchial complications which so often follow ether administration are reduced to a minimum.

What is claimed as new in this apparatus is the use of two gasometers with a mixing valve in the face mask.

The apparatuses illustrated above were manufactured by the Globe Manufacturing Company, Battle Creek, Mich.

NEW INSTRUMENTS OF USE IN SURGERY OF THE NOSE AND THROAT.

EDWIN PYNCHON, M.D.

Professor of Rhinology and Laryngology, Illinois Medical College. CHICAGO.

At the meeting of the American Medical Association in Chicago last June I presented a paper, entitled "Tonsillectomy in Children Under General Anesthesia—A Hospital Operation," in which were described certain new and novel instruments and devices, to which I desire to call the attention of the members of our Academy.

In Figure 1 is shown an anesthesia device, which is an outgrowth of the Brophy apparatus, and which, as thus modified, possesses the following described features:

To prepare for use, the first bottle is nearly filled with ether, while the second bottle contains only air. All of the air required for respiration is forced by the bellows through the two bottles, and then to a Y-shaped nasal tip whereby the two anterior nares are tightly plugged. In order to provide for the different ages from infancy to adult life, I find that four sizes of the nasal tip are required. With the lever on top of the first or ether bottle, in the position shown in cut, all of the air is forced through the tube reaching to the bottom of this bottle, when it bubbles up through the ether contained therein, after which it passes to the second or mixing bottle, in which is retained any fluid ether carried over by the air current should the operation of the bellows be too active. In this way the possibility of fluid ether being carried to the patient's nose is prevented.

The lever at the top of the ether bottle can be swung 180° when openings are created of ample size to allow practically all of the air current to pass directly to the mixing bottle, without being forced through the ether. In thus swinging the lever from the first to the last described position these openings are gradually enlarged so as to regulate the proportion of air passing through the ether, and thus by motion of the lever either diminution or increase of the per cent. of air passing through the ether is attained so as to regulate the amount of ether vapor absorbed. In this way the anesthetist can, by proper attention to the circulation and res-

^{1.} Jour. A. M. A., June 20, 1908.

piration, easily maintain the required degree of anesthesia without being at any time in the way of the operator, which is of great importance in operations in the mouth and throat. Furthermore, in this way the great disadvantage of interrupted administration is avoided, which is one of the chief objections associated with the use of the mask in this line of work.

The undesirable degree of cold observed when ether is given in the usual method with a mask is produced through evaporation,



Fig. 1.-Author's Anesthesia Apparatus (one-third size).

or, in other words, at the moment of transition from the fluid to the gaseous state, and it is through the direct breathing of air thus chilled that pulmonary complications have so often followed etherization. With this device this disadvantage is, to a large extent, eliminated, as the evaporation occurs in the ether bottle some distance from the patient, and by the time the etherized air reaches the patient its frigidity is materially diminished. Furthermore, as all air inhaled is forced through the nose before reaching the lungs, it is elevated to the degrée of body heat by the physiologic action of the nose, whereby there is additionally secured the required amount of humidity.

As all the air inhaled is caused to pass through the nose, exhalation, of necessity, occurs through the mouth, and thus all of the great disadvantage of rebreathing which occurs with the cone is at once eliminated. Until anesthesia is complete, partial inhalation

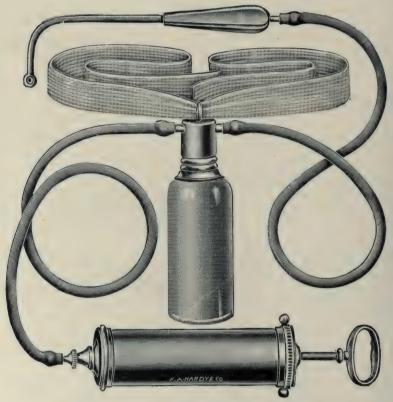


Fig. 2.—Author's Blood Aspirator (one-third-size).

through mouth breathing can be easily prevented by the anesthetist placing his hand over the patient's mouth during inspiration. In this way the pure anesthetic effect of the ether employed is secured independent of the partial asphyxiation which is so generally obtained with the use of the cone or mask. Furthermore, as the entering stream of air is thus constantly escaping from behind the soft palate, it, to a large degree, prevents blood entering the postnasal space, and thus assists the blood aspirator in its removal.

In order to assure the safety of all anesthetics, oxygen in some form is required. In the case of prolonged anesthesia by nitrous oxide, air for different reasons can not be employed, and oxygen gas is of necessity selected. With ether and chloroform a sufficient amount of oxygen can at all times be secured from the inhaled air, the only requirement being that a lethal dosage of the anesthetic vapor be avoided. When these agents are given from a mask an undesirable amount of the vapor may at any time be unintention-



Fig. 3.—Author's Automatic Tonsil Grasper (one-half size).

ally administered, particularly in the case of chloroform, the dense vapor of which accumulates through the patients "holding the breath" until a very deep inspiration must be taken, when the accumulated and dense vapor is inhaled. In the writer's opinion, this explains the chief cause of fatalities occurring at the beginning of chloroform anesthesia, the dense vapor being absorbed and carried directly by the pulmonary veins to the heart so as to cause cardiac failure. In fact, this is probably the chief, if not only, way



Fig. 4.—Author's No. 2 Four-Ring Tonsil Forceps (one-half size).

in which circulatory disturbance precedes respiratory failure during anesthesia. This theory was advanced by the writer several years ago.²

With the device being described the anesthetist has all these features under his direct control, and the desired amount of anesthetic vapor is mechanically regulated.

^{2.} The Medical Monograph, February, 1899.

Vomiting, following the use of ether particularly, has been found to be largely due to the swallowing of saliva in which ether vapor has been absorbed, and, as with ether salivation is always free, this feature of the anesthesia must be considered. To avoid this undesirable after-effect, it has been the custom of some surgeons, as a routine practice, to have the stomach washed out by lavage immediately after the anesthetic is withdrawn. It is easily apparent that this disadvantage can be overcome, and the requirement of such lavage avoided, if suitable steps are taken to prevent the accumulation of saliva in the mouth and its being swallowed. Another disadvantage due to the accumulation of secretions in the mouth is

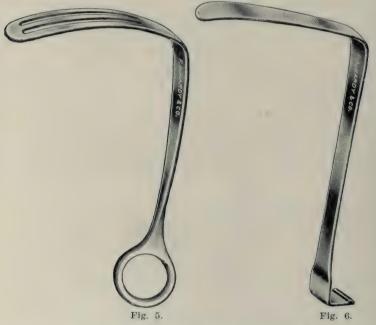


Fig. 5.—Author's Tongue Depressor (three-fifths size).

Fig. 6.—Author's Soft Palate Retractor and Baby Tongue Depressor (three-fifths size).

that by aspiration they may be drawn into the lungs. In fact, this is another and common cause of those pulmonary complications which have been so frequently manifested after ether anesthesia. In order to overcome this disadvantage and remove the saliva as it appears, I employ the aspirator shown in Figure 2, which also removes the blood, which is an ever-present feature in mouth and throat operations under general anesthesia.

The blood aspirator is a simple and efficient device whereby blood and secretions may be removed from the throat while the patient is in the Rose position. The mouth tube is held in one hand by the assistant, while with the other hand he manages the tongue depressor. Whenever there is call for aspiration the tip is introduced in the throat when the nurse operates the suction pump, so all fluids are drawn to the receiving bottle. A steady and slow pull of the syringe piston gives the best results. The only caution to



Fig. 7 .- Author's No. 1 Tonsil Shears (one-half size).

observe is to empty the bottle before further use should it become two-thirds full. The aspirator bottle is suspended from the neck of the assistant by a tape.

In Figure 3 is shown a new design of tonsil forceps, being spring actuated, automatic and self-retaining. The shaft, while of suffi-

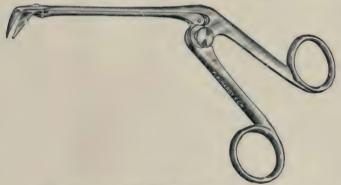


Fig. 8.-Author's No. 2 Tonsil Shears (one-half size).

cient strength, is so slender as to occupy the minimum of space, and thus be to the least degree in the way of the operator. This forceps was particularly designed for use in removing those flat or submerged tonsils so frequently found. There is a trick in the technic of its application. After the adjustment of the mouth gag and the proper depression of the tongue the forceps is introduced

with grasping blades fully opened, while the shaft is tilted to the opposite angle of the mouth, when the opened blades are firmly pressed against the tonsil by the operator's index finger, the point of the upper blade being at the very apex of the tonsil. By now releasing the spring a firm hold is secured. Any required strength of the spring may be secured by adjusting the regulating nut.

In Figure 4 is shown another design of tonsil forceps of particular use when the tonsil is friable and tears, or when, after the removal of the greater mass, some small shreds or points remain which can best be grasped with a wide pointed and toothed forceps. This forceps is made to be self-retaining by placing an elastic band about the handles as shown in cut.

In Figure 5 is shown the tongue depressor which I most often employ. As conditions differ in different cases, it is advisable to have one or two other forms of tongue depressor at hand. In Figure 6 is shown a baby tongue depressor which for infants is to be preferred. With this instrument is combined a soft palate retractor.



Fig. 9.—Author's Semi-Tonsillotone (one-half size).

In Figures 7 and 8 are shown the tonsil shears which I employ. Being constructed on the Grünwald plan, they combine great strength with small size. In one the blades cut in line with the shaft, while in the other they cut at right angles thereto, in both cases the cut being downward. While these shears are of small size, the cut made thereby is sufficient, and can be easily extended as desired by additional cuts. As both points are sharp, the tissue is easily punctured as with a knife, and still as in their use the cutting is chiefly done with the points directed medianward no increased danger of wounding the large vessels is incurred by the sharpened points.

The small size of these shears permits of their use with infants with much greater facility than when even the smallest sized tonsillotome is employed. Furthermore, while the tonsillotome at best slices off no more than such portion of the tonsil as can be pulled through the fenestra, and beyond the line of the pillars, it is only with proper cutting instrument, be it either knife or shears, that all of the tonsil can be removed, the doing of which always leaves a deep concavity or depression between the pillars.

One feature of importance in the construction of these shears is that the moving blade is so pivoted that in cutting it is pushed by the connecting shaft against or upon the fixed blade, which materially enhances its cutting power. The reverse method of construction is occasionally and erroneously employed.

While most surgical instruments presented as new are only modifications of previous patterns, the semi-tonsillotome, shown in Figure 9, possesses the feature of originality, and with its mate, the three-ring tonsil grasper, are unique in design. The semi-ton-sillotome, with cutting blade extended as shown in cut, serves as



Fig. 10.-Author's Tonsil Punch (one-half size).

an admirable tonsil hook-knife, the sharpened point of which easily pierces the tissue and, after the puncture, can be employed as such tonsil knives are by cutting with a pull. When the tissue punctured is tough, as frequently occurs with a submerged tonsil, a considerable pull is often required. In such case, by compressing the thumb in the ring end, the tissue being cut is pushed upon the knife edge and, by thus providing resistance, assists the cutting action of the knife blade, or, in other words, converts the knife into a shears which cuts at a right angle to the line of the shaft. As a semi-tonsillotome it cuts in any direction desired in severing the pedicle, and is thus employed in place of the cold snare. The only point to bear in mind is that while closing the blade a better cut is

made if the tissue being cut is on the stretch. In other words, precede the closure by a pull with the hook knife.

In the writer's opinion, the function of a tonsil punch is chiefly to remove small portions of tonsillar tissue, or points of elevation which occasionally remain after a cutting operation. The design shown in Figure 10 is so arranged that the cut is vertical, while the handles are held horizontal, when, with the projecting point of the cutting blades at either side, any remaining remnants beneath the anterior pillar, portions of the "velar lobe," can be



Fig. 11.—Author's Sterilizer Forceps (one-half size).

completely removed from either the right or left tonsil wound, and also any remnants remaining at either the apex, about the supratonsillar fossa, or at the bottom of the wound, remnants of infratonsillar tissue. Should a lateral cut be desired, the handles are held in a vertical position, preferably in the operator's right hand for the patient's right tonsil, and in his left hand for the patient's left tonsil. In this way any roughness remaining on the posterior pillar can best be removed. This trimming up or smoothing of the wound when required is generally best done about five days after



Fig. 12.—Author's Post-Nasal Applicator (one-half size).

the operation, and is absolutely painless after a brief application of a 20 per cent. solution of cocain. It, furthermore, when called for, materially diminishes the soreness and advances the healing of the wound. While the punch is sometimes of service at the time of the operation, its value is diminished by the operative field being obscured by blood, and, while at this time the wound may seem to be perfectly smooth, points of roughness often become noticeable a few days thereafter.

After instruments have been sterilized by boiling, the usual custom is to remove them from the sterilizer by lifting out the perforated tray upon which they rest. For this purpose hooks are provided with the sterilizer. This was formerly my custom, though it is a method inconvenient to employ, particularly when only a few instruments are required, or when frequent sterilizations are necessary. Latterly, I have discarded the hooks and do not remove the tray from the sterilizer, but instead remove one instrument at a time with the forceps shown in Figure 11, and after holding it for a second in a stream of hot water, in order to rinse off the sterilizing fluid. I partially dry it with a towel and place it for a short time in the drying oven,3 which method of treating instruments with joints, as those on the Grünwald plan, assures thorough cleans-

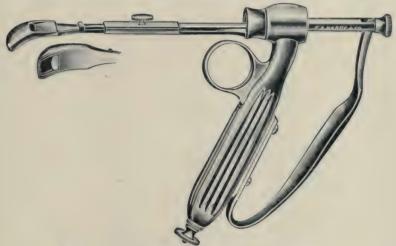


Fig. 13 .- Author's Lingual Tonsillotome (one-half size).

ing without the requirement to dissemble and avoids the formation of rust in the inaccessible joints. This forceps is so formed that, while it easily and securely grasps the largest instrument employed, it will also with equal facility pick up the smallest instrumentin fact, even a needle.

The postnasal applicator shown in Figure 12 I have found to be ideal, though of larger size than those in common use. When liberally wrapped with cotton, suitably medicated, the entire nasopharynx can be thoroughly swabbed, and particularly the fossæ of Rosenmuller, the massage of which a few times is required after having been curetted. In using any postnasal applicator, particu-

The Laryngoscope, May, 1906.
 The Laryngoscope, March, 1907.

larly when silver solutions are being employed, caution must be given that after medicating the cotton it be partially dried by pressure, or else excess fluid may trickle down to the larynx and become excessively annoying. This suggestion applies particularly to this applicator, owing to the larger amount of cotton required than is employed with more delicate applicators. For children a smaller size is required.

For removing the lingual tonsil different instruments have been suggested. In the form shown in Figure 13 the tonsillotome is

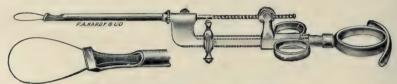


Fig. 14.—Tonsil Snare Canula (one-third size).

combined with a tongue depressor. In its use several bites may be required. Each time, after closing the cutting blade, the instrument is removed and contains the severed portion in a little box. By being rigid it can be pressed firmly in this lymphoid tissue, when not lobulated, and thus made to shave off sections thereof. To this device is attached the same handle employed with my ton-sillotome previously described.⁵

In Figure 14 is shown an improvement I have made in my tonsil snare.⁶ I have learned of cases wherein, when carelessly used, one side of the wire loop was allowed to escape through the side opening in the end of the canula, as originally made, and in this way the part engaged in the loop was not severed. As the snare was thus

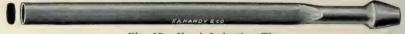


Fig. 15.-Nasal Irrigation Tip.

locked, much annoyance was experienced by both the patient and the operator, and the operation had to be completed with either a knife or a shears in order to release the snare. In the improvement shown the side opening is discarded and a solid band reaches from one side to the other, so the desired end slit is retained. In adjusting the loop the ends of the wire are introduced in the hole in the bodkin in the usual manner and then the loop is drawn within the canula far enough to allow the bend in the loop to just pass the band at the end of the canula, when, by an outward push, the loop

^{5.} Annals of Otology, Rhinology and Laryngology, June, 1906.6. The Laryngoscope, December, 1904.

passes easily beneath this band and can then be enlarged and shaped as desired.

For many years I have employed irrigations after intranasal operations wherein bone was cut, and have previously described the tip I employed, which was made of hard rubber. Latterly I have been using a metal tip of smaller diameter and slightly longer, as shown in Figure 15, and have been much better satisfied therewith.

These described instruments have all been made for me by F. A. Hardy & Co. of Chicago.

103 State Street.

NEW INSTRUMENTS.

Dr. Carney, Hamilton, Ohio, exhibited a tonsil knife.

DR. METZENBAUM, Cleveland, Ohio, exhibited a tonsil dissector.

Dr. Andrews, Chicago, exhibited a guarded middle turbinate chisel, the idea being to place the cutting edge against the front border of the neck of the turbinate and with partial pressure to cut entirely away or as far back as desired and finish with the snare, the finger regulating the depth that it goes into the nose.



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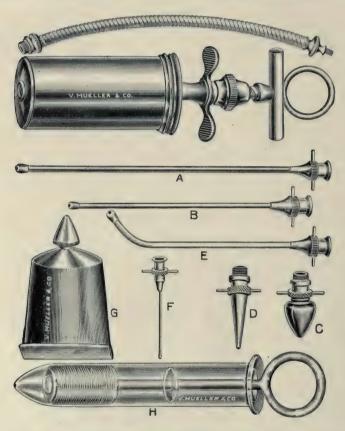
Middle Turb inate Chisel.

A transilluminator for use outside the office. It consists of a small illuminating dry cell and a miniature lamp on the end of a tube. It is used for transilluminating the frontal sinus, the mastoid, and when the hood is removed can be used for the antrum of Highmore. The battery becomes exhausted after awhile and must be renewed. The instrument is especially valuable for taking to the bedside of patients and for use where electric current can not be obtained.

Dr. Beck, Chicago, exhibited a syringe for the use of bismuth paste. Dr. Beck said: This is not my instrument, but is simply a syringe for the use of bismuth paste in the treatment of suppura-

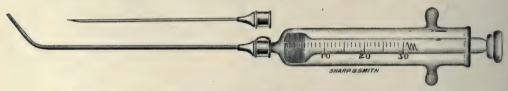
^{7.} The Laryngoscope, February, 1905.

tive cavities. I do not wish to take up much time. I simply want to show the instrument. It is a very strong syringe that is now



on the market. This bismuth paste has considerable therapeutic value in suppurative cavities and in a number of diseases, which I will describe in a later paper before the Chicago Medical Society.

Dr. Stein, Chicago, exhibited an improved special hypodermic syringe for the purpose of injecting the nasal nerves in the treat-



ment of hay fever by the nerve-blocking method, the paper on this subject having been read at the annual meeting of this society held

in Louisville last year and also at the recent A. M. A. meeting in Chicago, before the Oto-Laryngological Section.

Dr. Stein also presented a combination nose and throat snare with several different attachments—one for removing nasal polypi, one for removal of the posterior turbinal enlargement, and one for the removal of tonsils. The advantages of the snare are its great length and the ease with which it can be taken apart and sterilized.



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*Barek, C	2715 Locust St., St. Louis, Mo.
*Barkan, Adolph17	00 California St., San Francisco, Cal.
Barney, B. A	

Barnes, A. S	Missouri Trust Bldg., St. Louis, Mo.
Batholomew, A. C	400½ Broadway, Logansport, Ind.
	Ashtabula, Ohio
Battle, K. P. Jr	Raleigh, N. C.
Beane Geo W 3	17 Chartien Ave., McKees Rocks, Pa.
	Fargo, No. Dak.
Beattie Roht	548 Baker St., Detroit, Mich.
*Rock Jos C	
Reche C S	.173 Wisconsin St., Milwaukee, Wis.
	103 State St., Milwaukee, Wis.
	26 Allen St., Buffalo, N. Y.
Permetein Ed T	1511 Madison Ave., Kalamazoo, Mich.
Direct, H. S	. 252 Mountain St., Montreal, Canada
*Dlade M	327 Franklin St., Buffalo, N. Y.
	Majestic Bldg., Denver, Colo.
	. 128 Wisconsin St., Milwaukee, Wis.
	.1411 California Ave., St. Louis, Mo.
	338 Central Ave., Dunkirk, N. Y.
	. 226 Marlborough St., Boston, Mass.
	1390 Scott St., Covington, Ky.
Bliss, Chester B	Sandusky, Ohio
	119 S. Ludlow St., Dayton, Ohio
Bowles, F. J	121 W. 93rd St., New York City
*Boyd, E. TAmerican	National Bank Bldg., Leadville, Colo.
*Bradfield, J. A. L	Main and Fifth Sts., La Crosse, Wis.
Brawley, F. E	72 Madison St., Chicago, Ill.
Briggs, H. H	
Briggs, Wm. E	1005 K St., Sacramento, Cal.
	003 University Block, Syracuse, N. Y.
Brobst, Chas. H	Peoria, Ill.
*Brose, L. D	501 Upper First St., Evansville, Ind.
	1625 Cedar Ave., Cleveland, Ohio
Brown, E. J39	Syndicate Block, Minneapolis, Minn.
	239 E. Town St., Columbus, Ohio
*Bruner, Wm. E514	New England Bldg., Cleveland, Ohio
*Brunson, Randolph	
Bryan, W. M	.3746 Windsor Place, St. Louis, Mo.
Bryant, A. G	.416 Marlborough St., Boston, Mass.
	57 W. 53rd St., New York City
	.96 S. Franklin St., Wilkesbarre, Pa.
Buckwalter, John C	603 Carlton Bldg., St. Louis, Mo.
Bulette, W. W	Pueblo, Colo524 E. Capital Ave., Springfield, 11l.
Bullard, R. I	.524 E. Capital Ave., Springfield, 111.
Bullard, Wm. L	
*Bulson, Albert E	55 W. Wayne St., Ft. Wayne, Ind.
Burke, Thos. A	536 Rose Bldg., Cleveland, Ohio
*Burrell, H. L	15th and Dodge Sts., Omaha, Neb.
	482 Franklin St., Buffalo, N. Y.
	155 Lowry Bldg., St. Paul, Minn.
	1509 Poplar St., Philadelphia, Pa.
	Oklahoma City, Okla.
	Battle Creek, Mich.
27.38.00, 00.00 20000000000000000000000000000	The creek, mich.
Calhoun F P	833 Candler Bldg., Atlanta, Ga.
*Calhoun, A. W	833 Candler Bldg Atlanta Ga

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*Campbell, Don M	
*Caplan Leo	
Carmody, T. E	
Carpenter, J. T	
Carow, Fleming	511 Washington Arcade, Detroit, Mich.
	Elmira, N. Y.
*Cassalharen Wm F	
	Lowry Arcade, St. Paul, Minn.
	Jackson Bldg., Denver, Colo.
	303 W. Chestnut St., Louisville, Ky.
Cheney, F. E	126 Commonwealth Ave., Boston, Mass.
*Church B #	4048 Frost Bldg., Los Angeles, Cal.
	Danville, Ill.
	.229 N. Pennsylvania Ave., Indianapolis, Ind.
	224 N. Meridian St., Indianapolis, Ind.
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Conboy, Phillip	
Craig, Alex. R	2007 Chestnut St., Philadelphia, Pa.
Craton, S. B	700 University Blk., Syracuse, N. Y.
	214-215 Humboldt Bldg., St. Louis, Mo.
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Croskey, J. W	3325 Powelton Ave., Philadelphia, Pa.
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Culver, Chas. M	
Dahney S G	216 W. Chestnut St., Louisville, Ky.
Dobnor Wm D	
Dauley, Will. It	200 Clate Cla Chilara Til
Davenport, R. G	Trenton, Mo.
Davis, A. E	
Davis, J. Leslie	1700 Walnut St., Philadelphia, Pa.
	Pittsburg, Pa.
	Lincoln, Neb.
	214 Merriam Blk., Council Bluffs, Ia.
	122 Iowa Ave., Muscatine, Ia.
"Dean, L. W	Iowa City, Ia.
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Dennis, Frank L	501 N. Tejon St., Colorado Springs, Colo.
*De Schweinitz, Geo	
De Vilbiss, Allen	
Dickinson B M	
	711½ Market St., Chattanooga, Tenn.
	Butler, Pa.
*Donovan, J. A	M. and F. Hospital, Butte, Mont.

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*Faith, Thomas
Flagg, John D
Fowler, I. R. 508-10 Carleton Bldg., St. Louis, Mo. *Fox, L. Webster 1304 Walnut St., Philadelphia, Pa. Francis, Lee Masten 482 Delaware Ave., Buffalo, N. Y. Frank, Ira 103 State St., Chicago, Ill. Frank, Mortimer 103 State St., Chicago, Ill. Franklin, W. S. Butler Bldg., San Francisco, Cal. Frederick, M. W 2152 Sutter St., San Francisco, Cal. Freeman, E. D. Osgood, Ind. Freudenthal, Wolff 1003 Madison Ave., New York City Frey, C. L Scranton, Pa. *Fridenberg, P. H. 60 E. 58th St., New York City, N. Y. Friedenwald, Harry 1029 Madison Ave., Baltimore, Md. Friedmann, A. C. H. 2 N. Arcade, Colorado Springs, Colo. Fringer, W. R. William Brown Bldg., Rockford, Ill.
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*Hägler Flmer F	The Hägler Bldg., Springfield, Ill.
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Harris, W. C.	7th & Race Sts., Cincinnnati, Ohio
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Harvey, N. D	262 Benefit St., Providence, R. I.
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*Hawley, Geo. F	
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*Head, Gustavus P	
Heath, C. W	
	524 Penn Ave., Pittsburg, Pa.
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Hess Wm. L	400 California Bldg., Denver, Colo.
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Hibbard, W. E	307 E. Colorado St., Pasadena, Cal.
Hickey, Preston N	32 W. Adams St., Detroit, Mich.
Higbee, E. H41	16 Metropolitan Bldg., St. Louis, Mo.
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Hill, Arthur J	
Hilliard, Walter	1415 Welton St., Denver, Colo.
Hinnen, G. A	8-10 E. 8th St., Cincinnati, Ohio
*Hoffman J P	121°Wisconsin St., Milwaukee, Wis. 105 Washington St., Chicago, Ill.
	103 Washington St., Chicago, III.
*Holmes, Christian R.	
*Hood, Thomas C	. Willoughby Bldg., Indianapolis, Ind.
	836 Turk St., San Francisco, Cal.
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	34 Washington St., Chicago, Ill.
	183 Delaware Ave., Buffalo, N. Y.
*Hubbell, Alvin A	372 Franklin St., Buffalo, N. Y.
"Hunnell Alvin A	

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	.179 Shermerhorn St., Brooklyn, N. Y.
*Levy, Robert	California Bldg., Denver, Colo.
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	188 Franklin St., Buffalo, N. Y.
	454 Franklin St., Buffalo, N. Y.
*Lewis, George G	Syracuse, N. Y.
*Lewis R. H.	217 N. Wilmington, Raleigh, N. C.
	1434 Glenarm Place, Denver, Colo.
	.1208 Wyandott St., Kansas City, Mo.
Tillig J V	Davenport, Ia.
Linhart Christopher P	106 E. Broad St., Columbus, Ohio
*Linningott J A	1408 Arrot Bldg., Pittsburg, Pa.
Livingstone P J	307 Fine Arts Bldg., Detroit, Mich.
	3559 Olive St., St. Louis, Mo.
	3559 Olive St., St. Louis, Mo.
	833 Candler Bldg., Atlanta, Ga.
	212 W. Main St., Clarksburg, W. Va.
Love I. F	1305 Locust St., Philadelphia, Pa.
Lukana Chas	218 Michigan St., Toledo, Ohio
Burens, Chas	Jio Michigan Gt., Toledo, Olifo
Maire L E	203 Park Bldg., Detroit, Mich.
	1627 Walnut St., Philadelphia, Pa.
	Pope Blk., Pueblo, Colo.
	46 W. 53rd St., New York City
	247 Bull St., Savannah, Ga.
	870 Fell St., San Francisco, Cal.
	621 Rose Bldg., Cleveland, Ohio
	N. Pennsylvania St., Indianapolis, Ind.
Mather, Elmer L	Everett Bldg., Akron, Ohio
Manmenee A. E.	25.111 61
May, Chas. Henry	698 Madison Ave., New York City
May, Chas. Henry	698 Madison Ave., New York City 25 E. 77th St., New York City, N. Y.
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May, Chas. Henry *Mayer, Emil Metzenbaum, Myron	
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May, Chas. Henry *Mayer, Emil Metzenbaum, Myron McAllister, J. C *McCaw, J. H	
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*Rogers, A. S105	
*Rogers, W. K	188 E. State St., Columbus, Ohio
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Roy Dunbar	Grand Opera House, Atlanta, Ga.
Ruby, F. M	Union City, Ind.
Rust, E. G	Lennox Bldg., Cleveland, Ohio
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*Sattler, Robert	
*Sauer, W. E.	
	139 N. Spruce St., Nashville, Tenn.
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*Scales, J. W. *Scheppegrell, W. A. Schild, E. H. Clevel *Schneidemann, Theodore B	Pine Bluff, Ark. 124 Baronne St., New Orleans, La. and Ave. & Ninth St., Canton, Ohio 831 Chestnut St., Philadelphia, Pa
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	211 Ontario St., Toledo, Ohio
	627 Congress St., Portland, Me.
	Boulder, Colo.
Spohn, Geo. W	Elkhart, Ind.
*Sprague, Frank B	27 Stewart St., Providence, R. I.
*Standish, Miles	6 St. James Ave., Boston, Mass.
*Starkey, Horace M	Rockford, Ill.
Stanbery, Henry	8-10 E. 8th St., Cincinnati, Ohio
	523 Delaware Ave., Buffalo, N. Y.
	71 W. 49th St., New York City
	McPhee Bldg., Denver, Colo.
	500-510 Everett Bldg., Akron, Ohio
	Auburn, Ind.
	3603 Fifth Ave., Pittsburg, Pa.
	1831 Chestnut St., Philadelphia, Pa.
	513 Goldsmith Bldg., Milwaukee, Wis.
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	8 E. 8th St., Cincinnati, Ohio
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*Suker, Geo. F	103 State St., Chicago, Ill.
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	2 Commonwealth Ave., Boston
Thompson, E. H	19 W. 7th St., Cincinnati, Ohio
Thomson, J. J	40 W. 47th St., New York City
	1426 Walnut St., Philadelphia, Pa.
	112 E. Broad St., Columbus, Ohio
	4 Pillsbury Bldg., Minneapolis, Minn.
	.145 Monroe St., Grand Rapids, Mich.
	1387 E. 105th St., Cleveland, Ohio
Turnbull, Chas. S	1935 Chestnut St., Philadelphia, Pa.
Tydings, Oliver	
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	24 E. 8th St., Cincinnati, Ohio
	164 E. 61st St., New York City
*Van Shrke E W	Lima, Ohio
Van Slyke, F. W	204 Baltimore Blk., St. Paul, Minn.
	Little Rock, Ark.
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*Voorhees, Sherman	
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*Wadsworth, O. F	
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Wales, E. de W	320 N. Meridian St., Indianapolis, Ind.
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Wright John Wooley	
*Wirdomann H V	105 Grand Ave., Milwaukee, Wis.
Wyler T S	Groton Bldg., Cincinnati, Ohio
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Vankauer Sidney	616 Madison Ave., New York City
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Toung, Harry D	



